PAYLOAD USER DEVELOPMENT GUIDE (PUDG)

FOR THE

SPACE STATION TRAINING FACILITY (SSTF)

PAYLOAD TRAINING CAPABILITY (PTC)

APPENDIX I

PTC FACILITIES AND PROCEDURES

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10.1 INTRODUCTION

10.1.1 Identification

This document is Appendix I, PTC Facilities and Procedures, of SSP-50323, Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC).

10.1.2 Purpose

This document provides information useful to personnel who support payload training in the SSTF using PTC facilities and services. It provides descriptions of SSTF and PTC facilities at the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) that support International Space Station (ISS) payload training. Facilities include crew training modules located at the SSTF in JSC Building 5 South and support areas located at the SSTF. It also provides information about procedures and requirements for logistics and handling, safety, and security that apply to the SSTF and PTC facilities and to personnel who work in those facilities.

10.1.3 Introduction

The SSTF is a strategic, permanent resource located at NASA JSC in Houston, Texas, established with the purpose of providing the capability to perform full-mission training of ISS flight crewmembers and ground support personnel at JSC and Marshall Space Flight Center (MSFC). The SSTF provides facilities, services, training equipment, and simulations of ISS modules and the environment. The PTC provides additional facilities and services to support training of ISS flight crewmembers and ground support personnel on the operation of U.S.-sponsored payloads.

The primary audience for this document is personnel who have responsibilities related to providing a Payload Training Simulator (PTS) to be used in the SSTF using the PTC. Those individuals will normally be associated with the Payload Element Developer (PED), the sponsoring NASA Payload Development Center (PDC), or other support groups and contractors. In the PUDG and in this Appendix I, those organizations are collectively known as the Payload Developer (PD).

Organizations that support payload operations training at the SSTF using the PTC include the Payload Operations Integration Function (POIF) managed by NASA MSFC, including POIF Simulation Engineering, and NASA JSC.

The SSTF can be contacted as indicated in Section 1.5 for questions about the SSTF and PTC.

10.1.4 Document Overview

This appendix consists of the following sections:

a. Section 10.1 specifies the identification, purpose, and document overview of this appendix.

b. Section 10.2 identifies reference documents related to material in this appendix.

c. Section 10.3 provides information about facilities included in the SSTF and PTC in JSC Building 5 South.

d. Section 10.4 describes procedures related to movement of training material into, inside, and out of the SSTF and PTC.

e. Section 10.5 identifies safety requirements for the SSTF and PTC.

f. Section 10.6 describes security procedures for access to the SSTF and PTC and describes provisions for security of equipment and computer-readable media in the SSTF.

g. Section 10.7 provides a list of acronyms used in this appendix.

10.2 APPLICABLE DOCUMENTS

The following documents of the exact issue shown are an applicable part of this document to the extent specified herein. Subtier documents referenced in the cited documents are not applicable unless referenced within this document. In the event of conflict between the documents referenced herein and the content of this document, this document shall be considered a superseding document.

Code of Federal Regulations (CFR), Title 29: Labor, Part 1910, OSHA (General Industry Standards), 01 July 1998

Federal Communications Commission (FCC) Rules and Regulations, Part 15: Radio Frequency Devices, Subpart B: Unintentional Radiators, Class A, 24 May 2001

JHB-1600.3, Johnson Space Center Security Manual, Revision D, May 1989

JPG-1700.1 Johnson Space Center Safety and Health Handbook: Policy, Requirements, Instructions, and Guidelines, Revision H, 01 February 1999

JPG-2810.1, Johnson Space Center Information Technology (I/T) Security Handbook, Revision A, 01 October 2000

JSCM-1700, Johnson Space Center Safety Manual, Revision D7, May 1995

NEC/NFPA-70, National Electric Code, 1996

NHB-1700.1 (V1-B), NASA Safety Policy and Requirements Document, 01 June 1993

NMI-1710.3, Safety Program for Pressure Vessels and Pressurized Systems, Revision D, 02 February 1994

NPG-2810.1, NASA Procedures and Guidelines, 26 August 1999

PTS User’s Guide (to be published separately for each PTS)

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10.3 SSTF PTC FACILITIES

The SSTF PTC facilities in JSC Building 5 South include the following:

a. Crew Station Elements

   1. U.S. Laboratory Trainer Module (Lab)

   2. Secondary Lab (SLab)

b. Receiving/Shipping area

c. Rack Build-Up area

d. Storage areas

e. Briefing/debriefing rooms

f. Tabletop Payload Training Capability (TPTC)

10.3.1 SSTF PTC International Standard Payload Rack Locations

Some crew station elements in the SSTF include International Standard Payload Rack (ISPR) locations, each of which provides structural and mechanical support, attachment points, electrical power, air-cooling capability, and data interfaces for an integrated PTS contained in an SSTF ISPR or a PD-provided rack with equivalent interfaces. Specifications for the SSTF ISPR are given in Appendix IV, Section 40.3.3. Interface specifications for PTSs in the crew station element ISPR locations are given in Appendix III, Section 30.4.

Note that the rack tilt capability of ISS flight ISPRs is not supported in the SSTF crew station elements. Tilting of a rack is not allowed for either training or actual maintenance. Maintenance access to a PTS while it is installed in a crew station element ISPR location is restricted to the front or rear of the rack. If access to the sides or top of a rack is required, it must be moved from its normal position in the crew station element.

10.3.2 U.S. Laboratory Trainer Module

The Lab is located in the SSTF on the second floor of JSC Building 5 South. The Lab provides an operating environment and spatial orientation commensurate with the ISS U.S. Laboratory flight element to the maximum extent possible in an earth-gravity training environment. In addition to the rack area, the Lab includes a low-fidelity forward endcone and a high-fidelity aft endcone. The aft endcone is offset from the rack area to provide access to those endcone controls and displays normally blocked by adjacent racks. Closeouts will be provided if controls and displays are not represented.

The rack area of the Lab supports PTSs that provide training of ISS flight crew and ground support personnel on the operation of U.S.-sponsored payloads manifested in the ISS U.S.

Laboratory flight element. The Lab accommodates SSTF ISPRs, stowage racks, and faceplates necessary to configure the trainer with the proper interior spatial orientation for the flight being trained. Some racks, such as those located in the ceiling or floor of the ISS U.S. Laboratory flight element, will be relocated in the earth-gravity environment. The rack area is nine rack widths in length, to represent the ISS U.S. Laboratory flight element (six racks in length) and to accommodate three additional racks on each side for training on racks mounted in the ceiling and floor of the ISS U.S. Laboratory flight element. Floor and ceiling frames in the rack area can accommodate PTSs with a depth of up to 16 inches. The maximum weight of a floor or ceiling mounted PTS is 100 pounds.

10.3.3 Secondary Lab

The SSTF includes a SLab on the second floor of Building 5 South that provides a partial representation of the U.S. Lab flight element with six ISPR locations as described in Section 10.3.1. The SLab provides an area in which PTS integration and interface verification and test procedures can be conducted without impacting training sessions in the Lab. The SLab can also be used for preliminary training on PTSs that are not yet included in the flight complement in the Lab, or to support training on a PTS for a payload that is included in the flight complement in the Lab, but which for some reason cannot be located in the Lab. The SLab can be included in an SSTF training session for standalone training or it can be included in a training session with other training facilities, but cannot be included in the same training session as the Lab.

The SLab also accommodates Standalone Payload Training Capability (SPTC) sessions as described in Section 4.16. Individual integrated PTSs in SLab ISPR locations can be selected to be attached to a Payload Operations Integration Center (POIC) training session (refer to Section 4.15) without preventing use of other ISPR locations in a training session including the SLab asset.

10.3.4 Receiving/Shipping Area

Payload simulators are brought into the SSTF Receiving/Shipping area on the first floor of JSC Building 5 South. The Receiving/Shipping area will be used for unpacking and inspection of payload simulators and other items, and for preparing PTSs to be moved to training facilities. It will also be used for packing and preparation for return shipment.

The SSTF provides a fork lift and operator for moving containers and equipment. Tools normally used for opening shipping containers and tools and materials normally used for fastening and sealing shipping containers are provided by the SSTF. Tools and materials include the following:

a. Hammers

b. Pry bars

c. Screwdriver sets

d. Standard and metric tool sets

e. Fastening hardware (nails, screws, bolts, washers, nuts)

f. Package sealing tape

g. Staple gun and assorted lengths of staples

h. Strapping material and swaging tool

i. Shipping labels

j. A container for loose fill packing material

Refer to Section 10.4 for additional information on procedures used for unpacking, movement of PTSs between the Receiving/Shipping area and the training facilities, and packing for return shipping.

10.3.5 Rack Build-Up Area

The Rack Build-Up area is a restricted access area used for hardware installation, rack integration, preliminary testing of PTSs, and SPTC sessions. It can also be used for PTS maintenance that cannot be performed while the PTS is located in a crew station element. The Rack Build-Up area includes the following resources to facilitate hardware installation, any PTS hardware maintenance and/or modifications performed by the PD, and SPTC use:

a. Electrical outlets for 120 VAC single-phase, with a capacity of 20 amperes

b. Electrical power for 208 VAC three-phase, with a capacity of 20 amperes, terminated with the 208 VAC connector specified in Appendix III for the Standoff-Mounted Interface Panel (SIP)

c. Standard and metric tool sets

d. Screwdriver sets

e. Multimeter

f. Soldering equipment

10.3.6 Equipment Storage Areas

The SSTF includes storage areas for PTS-related item such as spares, consumables, special tools or test equipment, other support equipment, and PTS documentation. Provisions for protection of items that are either of high value or sensitive in nature are described in Section 10.6.3. Storage will be provided for PTS hardware through the completion of the applicable flight. The SSTF does not provide storage for reusable shipping containers provided by the PD.

10.3.7 Training Material Storage Areas

The SSTF includes areas for the storage of training materials, including hardcopies of simulation scenarios, timeline procedures, student and instructor guides, handouts, disks, tapes, and slides.

10.3.8 Briefing/Debriefing Rooms

Briefing/debriefing rooms are located on the second floor of Building 5 South. The two rooms are divided by a movable partition so they can be combined into one larger room. Both rooms include the capability to connect to the Video Switching and Distribution (VSD) subsystem and the Digital Voice Intercommunication Subsystem – SSTF Extension (DVIS-SE). One room includes a video conferencing system and 208 VAC power.

10.3.9 SSTF PTC Visitor Accommodations

Visitors to the SSTF can arrange for limited use of a telephone, facsimile machine, and photo copier while in the SSTF. These items are intended primarily for the normal use of personnel permanently located in the SSTF. Therefore, if a PD, simulation engineer, or other visitor to the SSTF requires office space or equipment on a continuing basis, arrangements should be made for facilities outside of Building 5 South.

10.4 SSTF PTC LOGISTICS AND HANDLING PROCEDURES

This section describes procedures related to movement of PTSs and other equipment into, within, and out of the SSTF. SSTF personnel are responsible for coordinating all movement of PTSs and other equipment within the SSTF. Note that all movement of items described here may be subject to further safety restrictions and limitations as defined in Section 10.5.

10.4.1 PTS Handling Arrangements

Most rack-level PTSs are expected to be implemented and shipped in accordance with a set of standard handling arrangements. If those arrangements are followed, the cost of handling at both the PD location and the SSTF will be minimized. The arrangements apply to PTSs for facility class payloads and to all rack-level PTSs. They are expected to be followed unless other arrangements are negotiated with the Training Strategy Team (TST). Standard handling arrangements are as follows:

a. The PD shall integrate the PTS into one or more Government-Furnished Equipment (GFE) SSTF ISPRs or equivalent racks that comply with handling specifications for an SSTF ISPR. The SSTF ISPR is described in Appendix IV, Section 40.3.3.

b. Information about obtaining GFE SSTF ISPRs is given in Appendix IV, Section 40.4.

c. If SSTF ISPRs are to be used, each empty SSTF ISPRs will be shipped to the PD in a GFE Rack Shipping Container (RSC). Refer to Appendix IV, Section 40.3.3.3.3, for a description of the RSC.

d. If SSTF ISPRs are used, the PD shall install the PTS into the SSTF ISPRs, pack the ISPRs in the RSCs, and ship them to the SSTF.

e. If PD-provided racks are used, the PD shall install the PTS into the racks, pack the racks into RSCs or equivalent containers, and ship them to the SSTF. Any reusable shipping containers provided by the PD will be returned to the PD at JSC when they are emptied. PD shipping containers will not be stored at the SSTF.

f. When the PTS in RSCs or equivalent containers arrive at the SSTF, normal handling procedures as outlined below will be used.

g. When training is complete, several shipping options are available for returning the PTS.

    1. An SSTF ISPR with a PTS installed can be returned to the PD in an RSC. The PD can then remove the PTS and return the empty SSTF ISPR in the RSC.

2. If the PD has provided racks with the PTS installed, they can be returned in PD-provided shipping containers.

3. The PD, with SSTF assistance, can remove the equipment from the SSTF ISPRs or other racks and pack it in PD-provided containers.

If any equipment is to be installed in a PTS at the SSTF, the following procedures apply:

a. Any special handling instructions shall be negotiated with the TST.

b. The PD, with assistance from SSTF personnel, shall install the equipment in the PTS.

c. Reusable shipping containers will be returned to the PD.

d. When training is complete, the PD, with assistance from SSTF personnel, shall remove the equipment from the PTS, if required.

e. The PD is responsible for providing containers for return shipment.

Additional information on handling procedures is provided in the following sections.

10.4.2 Shipping to the SSTF and SSTF Receiving

The PD is responsible for making arrangements with commercial carriers for shipment of PTS hardware and other training material to the SSTF. The carrier shall be instructed to stop at NASA JSC Receiving, where the SSTF Onsite Payload Coordinator will be contacted to arrange for receipt of the delivery. SSTF Logistics personnel will be responsible for providing an escort to JSC Building 5 South if needed. At Building 5 South, SSTF personnel will coordinate procedures to receive the delivery into the SSTF.

JSC personnel are responsible for moving shipping containers and their contents from the shipping vehicle into the SSTF. SSTF facilities include a fork lift, hand trucks, and pallet jacks to assist in receiving and unpacking procedures.

If the PTS is in an RSC, the SSTF has a well-defined set of procedures to follow for moving and unpacking. If the shipping container is not an RSC, the following restrictions apply:

a. The weight of the shipping container and contents shall not exceed the fork lift rated capacity of 6000 pounds.

b. To be moved by the fork lift, the shipping crate must have fork well pockets. If the shipping container cannot be moved by the fork lift, the weight shall not exceed 300 pounds.

c. The height of the shipping container shall not exceed 96 inches.

d. The width of the shipping container shall not exceed 60 inches.

e. The depth of the shipping container shall not exceed 60 inches.

f. The center of gravity of the shipping container with contents shall not be above the horizontal center line of the container.

SSTF personnel will move the shipping container from the shipping vehicle into the SSTF Receiving/Shipping area and place it on the floor. During this movement, the shipping container and contents shall be able to withstand the following without damage:

a. Tilting to ±10° from vertical along the Y axis (side to side)

b. Tilting to ±5° from vertical along the X axis (front to back)

c. Movement by a fork lift, including normal shock of routine handling

SSTF personnel will inspect the shipping containers for any external evidence of damage during shipment and will report any damage found to the PD. The shipping container will be stored unopened until PD personnel arrive for unpacking.

10.4.3 Unpacking

The PD is expected to be present when unpacking occurs and is responsible for ensuring that the PTS and other training material are unpacked properly. The PD is responsible for noting any concealed damage incurred during shipping and reporting it to the carrier. If so directed by the PD, SSTF personnel will provide assistance as listed below. If SSTF personnel assist with the unpacking, the PD is responsible for providing any specific instructions, including indicating the order of removal of packing and contents, to prevent damage. The SSTF will provide tools normally used for opening shipping containers as listed in Section 10.3.4. If any special tools are required for unpacking, they shall be provided by the PD.

If the shipping container is an RSC containing an SSTF ISPR or equivalent rack, SSTF personnel will perform the unpacking using procedures defined for an RSC. The RSC will be opened and SSTF personnel will use the fork lift to remove the SSTF ISPR or rack from the RSC and place it on the floor of the Receiving/Shipping area.

If the shipping container is not an RSC, it shall be capable of being opened while it is resting on the floor of the Receiving/Shipping area and shall not require an area larger than 10 feet by 10 feet for unpacking. SSTF personnel will assist the PD with the following:

a. Removal of bolts, screws, nails, or other fasteners from the shipping container. If any special tools are required, they shall be provided by the PD.

b. Use of the fork lift to relocate the package during unpacking provided there are no loose shipping container components or contents that could present a danger of injury or damage.

c. Use of the fork lift to raise the shipping container, provided that it can be done within safety limitations.

d. Movement of parts of the shipping container or contents that include a fork well for movement with the fork lift. The weight moved is limited to 2000 pounds.

e. Movement of parts of the shipping container or contents that must be moved by hand. The weight to be moved is limited to 50 pounds.

Any exceptions to normal procedures shall be negotiated with the TST.

All packing material shall comply with all safety requirements for flammability and shall not contain any hazardous material.

If the PTS was shipped in an RSC, SSTF personnel will resume control of it. If a PD-provided reusable shipping container was used, it will be given to the PD at JSC for disposition.

10.4.4 Inspection and Content Validation

The PD is responsible for identifying all items included in the delivery package and itemizing them on a shipping invoice. The shipping invoice will be used to identify items brought into the SSTF and will be saved by SSTF personnel for reference when training for the payload is complete and payload training items are being removed from the SSTF.

SSTF Logistics personnel are responsible for inspecting the contents of all payload training delivery packages in the SSTF Receiving/Shipping area and for verifying deliverable items against the PD-provided inventory listing. Verification will include the following:

a. Item or part number

b. Description

c. Bar-coded property identification tag number

   1. If applicable, a Government property identification tag number

   2. Otherwise, a PD-provided property identification tag number

d. Quantity delivered versus quantity on inventory listing

e. Presence of any proprietary indications

SSTF Logistics personnel are responsible for notifying the PD of any discrepancies between the inventory listing and the actual contents of the payload training delivery package. If SSTF Logistics personnel notice any apparent damage to any item in the payload training delivery package, they will notify the PD.

10.4.5 PTS Rack Movement

The SSTF is equipped to allow SSTF personnel to efficiently and safely move SSTF ISPRs or compatible racks inside Building 5 South. A PTS is attached to a Rack Mobility Unit (RMU), which accommodates two inflatable air bearings that are available in the SSTF. The air bearings can be inflated with an air pump to allow movement of the PTS over a smooth surface. Refer to Appendix IV, Section 40.3.3.3 for additional information.

10.4.6 Removal of PTS From Rack

If PTS equipment is to be removed from an SSTF ISPR or other SSTF rack, SSTF personnel will provide assistance, under the direction of the PD. If so directed, and if the PTS equipment was attached to the SSTF ISPR using only normal rack-mounting methods, SSTF personnel will remove PTS components weighing up to 50 pounds and place them on the floor of the Receiving/Shipping area. Heavy items shall have warning labels as specified in Section 10.5.

If any tools are required beyond those listed in Section 10.3.5, they shall be provided by the PD.

10.4.7 Packing of Training Material for Return Shipment

The PD is responsible for performing an inventory of training material to ensure that all components of the training package are accounted for. The PD is expected to be present when packing occurs to ensure that all items are accounted for and repacked properly for return shipping. SSTF personnel will provide the original shipping invoice for reference.

If the PTS is to be returned in an RSC, the SSTF will provide one if available. The PD will be responsible for returning the RSC to the SSTF after the PTS is removed. Otherwise, the PD is responsible for providing a container for return shipment. In either case, the PD is responsible for the cost of shipment.

SSTF personnel will provide packing and handling assistance under the direction of the PD. SSTF personnel will follow any specific packing instructions provided by the PD to prevent damage. The SSTF will provide tools and materials normally used for fastening and sealing shipping containers as listed in Section 10.3.4. If any additional tools or materials are required, they shall be provided by the PD.

If the PTS is in an SSTF ISPR or compliant rack and will be packed into an RSC, SSTF personnel can perform the complete packing following SSTF-defined procedures. If the PTS is an SSTF ISPR or compliant rack and is to be packed into a container other than an RSC, SSTF personnel will provide assistance with moving the rack consistent with corresponding procedures for packing an SSTF ISPR into an RSC.

Assistance will be provided with packing a PTS that is not in a rack and with packing other training material subject to the following limitations:

a. If an item is on a pallet with a fork well so it can be moved with the fork lift, items weighing up to 2000 pounds can be moved, provided there are no loose items that could cause injury or damage.

b. If an item requires movement by hand, limitations and labeling requirements as listed in Section 10.5 will apply. The weight limit is 50 pounds.

c. If the PD provides specially fitted containers with formed packing inserts, etc., SSTF personnel will assist with packing according to PD-provided instructions.

d. If items are to be packed into a container using loose fill packing material, the SSTF will provide the material in quantities for normal packing.

10.4.8 Return Shipment

SSTF personnel are responsible for coordinating shipping arrangements unless the PD requests their own arrangements. In some cases, the shipment package will be delivered to JSC Shipping/Receiving, with personnel there completing the shipment. In other cases, SSTF personnel will arrange with a commercial carrier to handle the shipping at the expense of the PD.

The PD is responsible for providing properly packed containers labeled for return shipment and for providing any special return shipping instructions.

10.5 SSTF PTC SAFETY REQUIREMENTS

SSTF facilities adhere to established NASA and Occupational Safety and Health Administration (OSHA) health and safety standards for areas including materials and processes, labeling, electrical safety, electromagnetic radiation, and noise levels. Refer to the current revision of the Code of Federal Regulations (CFR), Title 29: Labor, Part 1910, OSHA (General Industry Standards).

All PTSs and support equipment brought into the SSTF shall be designed to provide maximum safety and minimum risk to personnel during installation, operation, and maintenance of equipment. Suitable warning and protection shall be provided to prevent contact with electrical voltage, moving parts, and hazardous heat sources. It is the responsibility of the PD to identify and report hazards and the extent of potential risk involved in the testing, operation, and maintenance of their equipment. The PD shall provide copies of reports of safety and/or hazard analyses performed for the PTS or support equipment and any other material related to the safety of the PTS or support equipment. The copies shall be formally transmitted as part of the payload training delivery package. If copies are available earlier, they should be provided to the SSTF. If changes are made to the PTS or supporting equipment at the SSTF that change a hazard or potential risk, or if assessments of hazards or potential risks change, the PD shall provide copies of revised documents to the SSTF.

10.5.1 PTS Safety Requirements

Every PTS shall comply with the following safety specification and standards:

a. JSCM-1700, Johnson Space Center Safety Manual

b. NHB-1700.1 (VI-B), NASA Safety Policy and Requirements Document

c. Code of Federal Regulations (CFR), Title 29: Labor, Part 1910, OSHA (General Industry Standards)

d. NEC/NFPA-70, National Electric Code

10.5.2 Size and Weight

All PTS equipment shall have its weight and center of gravity identified. All handling and lifting points and features shall be clearly identified on the hardware. Special handling techniques, procedures, or equipment shall be identified in the PTS User’s Guide prior to hardware delivery to the SSTF.

All removable chassis units weighing over 35 pounds (16 kilograms) shall be labeled with the weight.

10.5.3 Markings, Signs, Warnings, Symbols, and Guarding

Each PTS shall incorporate the following:

a. Warning placards shall be mounted adjacent to any equipment that presents a hazard to personnel (e.g., from high voltage, heat, toxic vapors, explosion, ionizing radiation).

b. Electrical receptacles other than signal connectors shall be marked with their voltage, phase, and frequency characteristics.

c. Areas of operation or maintenance in which special protective clothing, tools, or equipment are necessary shall be specifically identified.

d. NO-STEP markings shall be provided where necessary to prevent injury to personnel or damage to equipment.

e. Hoist and lift points shall be provided and clearly labeled if mechanical or power lift is required.

f. PTSs with exposed moving parts that can cut or pinch shall have guards installed to protect operators.

g. The design shall incorporate methods to protect personnel from inadvertent contact with all voltages capable of producing shock hazards during operation and operation of equipment.

10.5.4 Touch Temperature Design Considerations

For surfaces that are to be touched with bare skin, the maximum temperature shall not exceed 113° F (45° C) and the minimum temperature shall not be below 39° F (4° C). Adequate warning labels shall be provided to alert personnel of areas that may be outside these temperature limits.

10.5.5 Personnel Certification Requirements

All PD personnel who are tasked with operating any hazardous equipment shall provide proof of individual current safety training or operator certification for each item of hazardous equipment to be operated. The required proof should be provided to the SSTF at least 30 days prior to delivery of the hazardous equipment to the SSTF.

10.5.6 Accessibility and Maintenance

Accessibility shall be provided to PTS equipment to ensure the safety of maintenance personnel and preclude damage to other equipment. The PTS equipment, when properly installed and integrated, shall allow for proper and safe maintenance activities.

10.5.7 Ventilation

If the PTS is installed in an SSTF ISPR, ventilation will be provided as described in Appendix IV, Section 40.3.3.2. If the PTS is not installed in an SSTF ISPR, it shall provide a self-contained ventilation system. Floor plenum air cooling is available as stated in Appendix III, Section 30.4.5.1. The PTS equipment exhaust air temperature shall not exceed 110° F (43° C). PTS exhaust air shall not contain airborne contaminants greater than 100 micron in size.

PTS equipment shall not exhaust or vent toxic fluids or gases to the facility atmosphere.

10.5.8 Acoustical Requirements

The PTS equipment noise level shall not exceed 80 decibels, A-weighted (dBA) while in operation.

10.5.9 Electromagnetic Radiation

The PTS shall be designed such that it is compliant with Federal Communications Commission Rules and Regulations, Part 15, Subpart B, Class A, for protection against electromagnetic interference/radio frequency interference for commercial equipment, unless otherwise specified.

10.5.10 Electrostatic Discharge (ESD) Control

It is the responsibility of the PD to identify ESD-sensitive items and related protective handling procedures prior to delivery to the SSTF. ESD-sensitive hardware shall carry proper identification warning labels to minimize damage to the item during handling and storage.

10.5.11 Pressure and Vacuum Systems

The NASA program for ensuring structural integrity of pressure vessels and pressurized systems and for minimizing the associated mishap potential is outlined in NASA Management Instruction (NMI) 1710.3, Safety Program for Pressure Vessels and Pressurized Systems.

10.5.12 Transportability

Components and support equipment for a PTS of any class shall comply with all SSTF handling procedures and limitations. The PTS and its shipping container shall be designed for transportability by commercial transportation. Adequately located and strengthened tie points and hoisting or lifting provisions shall be provided. Acceleration and deceleration limits shall be provided for each axis of each PTS as applicable for transporting within the SSTF. Any special handling procedures are the responsibility of the PD and shall be documented in the PTS User's Guide.

10.5.13 Materials and Parts

PTS equipment shall not contain the following hazardous materials:

a. Materials producing harmful toxic effects

b. Material that is not fungus inert

c. Materials containing mercury

d. Human body fluids or waste

e. Animal body fluids or waste

f. Poisonous, flammable, and corrosive fluids and gases

g. Biological hazards

h. Radiation hazards

i. Cryogenic materials

Flammable solid materials shall be kept to a minimum.

10.5.13.1 Compressed Gases

Flammable, corrosive, oxidizing, and poisonous gases are prohibited from use within the SSTF. Small quantities of commercial liquid aerosols in original containers used for lubrication and cleaning may be used.

Nonflammable and nontoxic compressed gas such as Carbon Dioxide (CO_2) and Nitrogen (N_2) may be brought into the facility subject to the following restraints and conditions:

a. All gases and handling procedures shall comply with the requirements of Chapter 311, "Pressurized Gas and Liquid Systems," of the latest revision of JPG-1700.1, JSC Safety and Health Handbook.

b. Full details, including the contents, size, and pressure of containers, shall be provided to SSTF safety personnel at least 2 weeks in advance so that Oxygen (O_2) displacement calculations may be made for the intended location of use and storage.

c. Written procedures describing how the compressed gas will be used within the SSTF shall be provided to SSTF safety personnel for approval prior to use.

d. Gas containers shall have legible labels that identify their content.

e. Current Material Safety Data Sheets (MSDSs) shall be supplied to SSTF safety personnel for all gaseous products. In addition, a file of MSDS sheets for each gas used shall be available in close proximity to the storage location.

f. The PD shall be responsible for the handling and storage of all compressed gases within the SSTF. SSTF safety personnel must approve all storage locations and shall be kept aware of quantities in each location.

g. The PD shall be responsible for the removal of all full, partially filled, and empty containers from the SSTF. Empty containers shall be marked as empty and removed from the area in which full containers are stored to prevent confusion.

10.5.14 Material Safety Data Sheets

MSDSs shall be provided with any PTS items that may provide a safety or health hazard, including cleaning solvents and materials required to support the maintenance and operation of the PTS.

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10.6 SSTF SECURITY PROCEDURES

This section describes security requirements and procedures that shall be complied with by all personnel working in or visiting the SSTF for any reason and provides information about how individuals are to obtain access to the SSTF. It also describes security resources available to users of the SSTF and security procedures related to electronic media in the SSTF.

10.6.1 NASA JSC Site and Building Security

All individuals working in JSC facilities must obtain a NASA/JSC site badge from JSC Security. Access to certain areas is limited to specifically authorized personnel. These areas are designated as Controlled Access Areas (CAAs). An additional level of approval is required for access to any CAA. The main SSTF building, 5 South, is a CAA. Unescorted access to a CAA requires a properly encoded badge to be read by a card-controlled access system. When CAA access is authorized for an individual with a permanent JSC site badge, the magnetic stripe on the badge will be encoded for access to the approved CAA. For an individual with a temporary JSC badge, an additional temporary CAA badge properly encoded for access to the approved CAA will be provided. Short-time visitors to CAA facilities may obtain an Escort Required badge.

10.6.2 Obtaining Necessary NASA JSC Badges

The submission process for JSC site badges is outlined in JHB-1600.3, JSC Security Manual. The process for obtaining CAA and related physical access is outlined in JPG-2810.1, JSC Information Technology (I/T) Security Handbook. Due to the lengthy processing time, the process for obtaining access should be started as far in advance of the anticipated need date as possible. The primary responsibility for providing assistance in obtaining NASA/JSC badges is assigned to the sponsoring NASA organization.

A permanent or temporary JSC site badge may be acquired by obtaining and submitting a NASA/JSC Badge Request Form (JSC Form 473A) through the applicable NASA Project Sponsor or by contacting JSC Security. A JSC site badge does not require a background investigation.

Access to CAAs may be acquired by obtaining a CAA Card Request (JSC Form 722) from the appropriate NASA Project Sponsor, having it approved by a Mission Operations Directorate (MOD) Designated Approving Official, and submitting the form to JSC Security. Permanent or temporary unescorted CAA access requires a background investigation within the last 5 years. If needed, JSC Security will conduct the investigation. The background investigation takes a minimum of 2 weeks for a U. S. citizen and can take 3 to 4 months or longer for an individual who is not a U.S. citizen. All applicable forms for a background investigation may be obtained from and processed through the appropriate NASA Project Sponsor. Individuals who have had a background investigation within the last 5 years can save considerable processing time by making arrangements through their NASA Project Sponsor to have that investigation included in the JSC Security database prior to requesting badges and access. Those awaiting completion of their background investigation may obtain an Escort Required badge to enter CAAs.

10.6.3 Protection of High-Valued Items

The SSTF includes storage for the protection of property that is either of high value or sensitive in nature. A locked storage area is provided for larger items such as PTSs. Secure containers are provided for smaller high-value items and proprietary documentation. Secure facilities are in designated areas in Building 5 South and include a combination of file cabinets, equipment cabinets, desks, and wall lockers.

10.6.4 Computer and Data Security

All SSTF computer systems are included in the Mission Information Category. Information, software applications, and systems in the Mission Information Category are those that control or directly support human space flight, training for human space flight, or developing the data or software used to control human space flight. If information, applications, or systems in this category are altered, destroyed, or unavailable, the impact on NASA could

a. Be catastrophic in that it might result in the loss of major or unique assets

b. Pose a threat to human life

c. Prevent NASA from preparing or training for a critical mission of the Agency

SSTF computer systems are compliant with protective measures specified in JPG-2810.1. These measures include the following:

a. Control of access to computer system and communication networks

b. Protection of application, data, and information by use of access privileges

c. Audit trail generation and reporting

d. Configuration management

e. Backup and retention of systems, applications, and data

f. Planning for disaster recovery or contingency events.

10.6.4.1 SSTF Electronic Access

Electronic access to all SSTF computer systems, including Instructor/Operator Stations (IOSs) at the SSTF or the Remote Area for Payload Support (RAPS) at MSFC, real-time or offline processor platforms, and the Ground Software Development Environment (GSDE), requires a properly authorized User Identification (USERID) code and password. JPG-2810.1 provides direction for obtaining authorized access to SSTF computer systems. The sponsoring NASA organization has primary responsibility for providing assistance in obtaining SSTF electronic access. To obtain initial electronic access to an SSTF computer system, each individual shall submit a Raytheon System Access Request (SAR) Form (F-PA-03-1) through their NASA

Project Sponsor. Note that the SSTF will only grant standard SSTF system access (i.e., nonprivileged access) to individuals supporting PTS-related job functions. Privileged access will be retained by SSTF system administrators.

10.6.4.2 PDC I/T Security-Related Responsibilities

The primary responsibility for ensuring that PTS hardware and software are compliant with security requirements is assigned to the sponsoring NASA PDC. The PDC shall certify that all systems, hardware, software, applications, information, and data brought or transmitted into the SSTF are free of viruses and malicious content.

The PDC is responsible for the I/T Security status of a PTS that connects to SSTF computer systems. As such, the applicable NASA Payload Sponsor shall

a. Ensure that the PTS and all associated items meet all applicable and appropriate security requirements equivalent to those specified for the Mission Information Category.

b. Ensure that the PTS will not adversely impact SSTF computer resources. This includes the transfer of any virus or malicious code to the SSTF or the transfer of any data that could negatively impact SSTF applications.

c. Assume any I/T Security-related residual risk associated with the PTS and associated items.

d. Ensure that all remaining I/T Security program requirements (as defined by the payload applicable/sponsoring NASA Center) are met.

e. Include the following documentation in the payload training delivery package:

    1. Copy of approved PTS I/T Security Certification Statement(s). This statement will certify that the PTS satisfies all requirements equivalent to Mission Information Category security requirements applicable at that PDC, including those requirements set forth in the current version of NPG-2810.1, NASA Procedures and Guidelines.

    2. Formal statement certifying the PTS free of virus/malicious code and/or data. This statement will certify that the PTS and all associated electronic media do not contain any virus/malicious code, or any data, which, if transferred, could adversely impact the SSTF.

    3. Formal statement acknowledging PDC acceptance of any residual I/T Security-related risk. This statement will provide documented acknowledgment that the applicable PDC shall accept any I/T Security-related residual risk that may exist.

    4. I/T Security-related operational information:

(a) PTS protection requirements. This statement will document the level and/or type of protection requested for the PTS and associated items.

(b) PTS backup storage requirements (if any). This statement will document the protective storage requested for PTS software and/or data backups.

(c) PTS software/data contingency/recovery requirements. This statement will define the actions to be taken for the PTS should an SSTF contingency situation occur and will provide instructions for recovering the PTS operational capability from backup resources.

10.6.4.3 PTS Electronic Media

If the PD has a requirement to bring any computer readable electronic media into the SSTF, the PD is responsible for certifying that the media are free of viruses and malicious content before they can be accepted into the SSTF. Electronic media brought into the SSTF shall be limited to items required to perform the training task, including maintenance, testing, and diagnosis of PTS hardware or software.

If the PTS requires training-dependent data (see Section 4.8), the PD is responsible for certifying that the data is free of viruses and malicious content before it can be accepted into the SSTF. Only data specifically required for training will be accepted. If training-dependent data is accepted by the SSTF, SSTF personnel will place it under SSTF Configuration Management (CM) control, including maintaining backup and recovery copies. Training-dependent data shall be transported to the SSTF via compatible storage media.

Computer-readable media containing software or data developed or used by the PD will also be subject to the same control procedures described above. However, they will not be electronically processed by any SSTF computers. Creation of backup and recovery copies of PTS software and data is the responsibility of the PD. Copies of media containing PTS software and data for backup and recovery purposes can be given to SSTF personnel to be placed in secure storage. Procedures will allow the PD to retrieve items for temporary use and then return them to storage.

If any electronic media are brought into the SSTF or created within the SSTF and retained by PD personnel for use in performing training-related tasks, PD personnel shall be responsible for the proper labeling and protection of that media to ensure that the media are not inadvertently used by other groups.

10.6.4.4 PTS Electronic Transfers

No electronic transfer shall be made directly to any SSTF computer system from outside the SSTF, except through NASA secure transmission facilities. If any software or data from an outside source is required to be brought into the SSTF, the PD is responsible for certifying that it is free of viruses and malicious content.

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10.7 NOTES

10.7.1 Acronyms and Abbreviations

CAA	Controlled Access Area
CFR	Code of Federal Regulations
CM	Configuration Management
dBA	decibels, A-weighted
DRLI	Data Requirements List Item
DVIS-SE	Digital Voice Intercommunication Subsystem – SSTF Extension
ESD	Electrostatic Discharge
FCC	Federal Communications Commission
GFE	Government-Furnished Equipment
GSDE	Ground Software Development Environment
I/T	Information Technology
IOS	Instructor/Operator Station
IPT	Integrated Product Team
ISPR	International Standard Payload Rack
ISS	International Space Station
JHB	JSC Handbook
JPG	JSC Procedures and Guidelines
JSC	Johnson Space Center
JSCM	Johnson Space Center Manual
Lab	U.S. Laboratory Trainer Module
MOD	Mission Operations Directorate
MSDS	Material Safety Data Sheet
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NEC	National Electric Code
NFPA	National Fire Protection Association
NHB	NASA Handbook
NMI	NASA Management Instruction
NPG	NASA Procedures and Guidelines
OSHA	Occupational Safety and Health Administration

PD	Payload Developer
PDC	Payload Development Center
PED	Payload Element Developer
POIC	Payload Operations Integration Center
POIF	Payload Operations Integration Function
PTC	Payload Training Capability
PTS	Payload Training Simulator
PUDG	Payload User Development Guide
RAPS	Remote Area for Payload Support
RMU	Rack Mobility Unit
RSC	Rack Shipping Container
SAR	System Access Request
SIP	Standoff-Mounted Interface Panel
SLab	Secondary Lab
SPTC	Standalone Payload Training Capability
SSTF	Space Station Training Facility
TPTC	Tabletop Payload Training Capability
TST	Training Strategy Team
U.S.	United States
USERID	User Identification
VAC	Volts Alternating Current
VSD	Video Switching and Distribution

PAYLOAD USER DEVELOPMENT GUIDE (PUDG)

FOR THE

SPACE STATION TRAINING FACILITY (SSTF)

PAYLOAD TRAINING CAPABILITY (PTC)

APPENDIX II

SSTF PTC INSTRUCTOR/OPERATOR STATION (IOS)

DISPLAY DEVELOPMENT PROCESS

CONTRACT NO. NAS9-18181, SCHEDULE C

29 August 2001

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20.1 INTRODUCTION

20.1.1 Identification

This document is Appendix II, SSTF PTC Instructor/Operator Station (IOS) Display Development Process, of SSP-50323, Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC).

20.1.2 Purpose

This document describes the process used to develop displays for the SSTF PTC IOS. It is intended to be used by personnel with responsibilities for developing or supporting development of IOS displays used with the Payload Training Simulators (PTSs) that will be installed, integrated into, and operated in the SSTF PTC environment.

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20.2 APPLICABLE DOCUMENTS

The following documents of the exact issue shown are an applicable part of this document to the extent presented herein. Subtier documents referenced in the cited documents are not applicable unless referenced within this document. In the event of conflict between the documents referenced herein and the content of this document, this document shall be considered a superseding requirement.

SST-204, Volume 1, Integrated Training Facility (ITF) Human-Computer Interface (HCI) Style Guide and Standards, 16 May 1995

SST-204, Volume 2, ITF Full-Task Trainer (FTT) Instructor/Operator Station (IOS) Display Programming Rules for Real-Time Sammi Displays, Revision 1.1, 01 August 1996

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20.3 IOS DISPLAY DEVELOPMENT

IOS displays are used to control and monitor training sessions in the SSTF. Displays will be built using a standard SSTF display definition tool (currently Sammi, the Kinesix Corporation Commercial Off-the-Shelf (COTS) display builder/manager). Primary responsibility for developing IOS displays has been assigned to the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) Space Flight Training Division (DT). Supporting organizations are identified in the following section.

20.3.1 IOS Display Development Process Steps

The steps in the IOS display development process are shown in Table 20.3.1-I. In this table, the *Participants* column indicates the following organizations:

DT NASA JSC Space Flight Training Division

POIF NASA Payload Operations Integration Function, managed by the Marshall Space Flight Center (MSFC)

SSTF Space Station Training Facility personnel

PD Payload Developer – The organizations responsible for developing the PTS, including the NASA Payload Development Center (PDC), the Payload Element Developer (PED), and possibly other support groups and contractors, collectively referred to as the Payload Developer

Note that information about display formats provided by the PD can be provided using a method chosen by the PD. PD personnel are not required to learn to use the SSTF display definition tool.

The *Timeframe* column indicates the time at which the step in the process should occur in months before the Launch (L) of the payload to the International Space Station (ISS). NLT indicates “no later than.”

Table 20.3.1-I IOS Display Development Steps

Step	Process	Participants	Timeframe
1.	Review payload facility operational objectives.	DT, POIF, PD	L-30 or start of project
2.	Review PDC instructor displays.	DT, POIF, PD	NLT L-20
3.	Define types of IOS displays required for PTS operations.	DT, POIF, PD, SSTF	L-24 to L-20
4.	Define specific display requirements.	DT, POIF, SSTF	L-24 to L-20

Step	Process	Participants	Timeframe
5.	Identify PTS Input/Output (I/O) parameters in the Payload Simulator Requirements Document (PSRD), Volume II	POIF, PD	L-24 to L-20
6.	Identify I/O parameters using standardized Payload Simulation Network (PSimNet) data message buffer forms in the PUDG, Appendix III, Section 30.6.	DT, SSTF	NLT L-20
7.	Design basic payload IOS display formats.	DT	L-20 to L-18
8.	Coordinate display development and draft specifications.	DT, POIF, PD	
9.	Build basic displays using the SSTF display build tool.	DT, SSTF	L-18 to L-16
10.	Test basic displays using the Crew Station Input/Output Processor (CSIOP) payload agent.	DT, SSTF	
11.	Identify display discrepancies and document problems.	DT, SSTF	
12.	Correct discrepancies and retest displays.	DT, SSTF	
13.	Test displays using the PTS.	DT, POIF, PD, SSTF	NLT L-15
14.	Identify disprepancy source as display or PTS.	DT, POIF, PD, SSTF	
15.	Correct discrepancies and retest displays.	DT, POIF, PD, SSTF	
16.	Baseline displays for training.	DT, POIF, SSTF	L-13

20.3.2 IOS Display Development Process Details

Details of the steps shown in Table 20.3.1-I are as follows:

1. **Review Payload Facility Operational Objectives.** Representatives from DT, POIF, and PD will review the equipment operational objectives to develop training-related information and derive a basic understanding of the simulator operation.

2. **Review PDC Instructor Displays.** The PTS instructor displays required at the PDC will be reviewed and evaluated for carry-over into the SSTF PTC environment. These displays and controls will provide the core tools for simulator operations and training conducted at the PDC.

3. **Define Types of IOS Displays Required for PTS Operations.** Functional displays required to operate the PTSs in the SSTF PTC environment will be identified. These displays may include

    a. Initialization tables (payload-unique data requirements)

    b. Simulation system overview/component status

        (1) Math models

        (2) Interactive controls

        (3) Malfunction controls

    c. Simulator system overview and status

        (1) Processor

        (2) Peripherals

    d. Virtual switch pages (IOS CRT representations)

        (1) Switch status monitoring

        (2) Initialization state indication

    e. Payload user interface device/procedure display emulation

    Support of IOS displays must be integrated into the PTS models and controls during the design of the PTS. Engineering displays may be required at the PDC to exercise the support capability before shipment of the PTS to the SSTF. See Appendix III, SSTF-to-PTS Interface Specification, for interface and processing requirements.

4. **Define Specific Display Requirements.** Coordination between JSC and the POIF will be required to prepare a requirements set for each specific display identified for IOS PTS operation. The requirements shall address

    a. Functional capabilities of the displays

    b. Parametric ranges/scaling

    c. System/subsystem representation

d. Interactive fields/symbols

e. Model parametric identifications

f. Initial control positions

g. Malfunction definitions and variables

h. Resource utilization interfaces

Each display requirements set shall be complete to the point of supporting initial display design and related documentation.

5. Identify PTS I/O Parameters in the PSRD, Volume II. I/O parameters supporting the IOS displays shall be identified and specified in Volume II of the PSRD. These terms will be established and allocated to locations in the PSimNet standard data message buffers defined in Appendix III, Section 30.6. The generic standard message buffer layouts can be tailored to a specific payload by populating the blank column reserved for the PTS variable names in each of the messages. The parameters include

a. Data

b. Control (moding, timing and synchronization, etc.)

c. Variables

d. Telemetry

e. Commands

Parameter verification information shall be included in the PSRD, Volume II.

6. Identify I/O Parameters Using Forms in the PUDG, Appendix III, Section 30.6. I/O parameters required by SSTF IOS displays shall be identified on PSimNet Buffer Layout forms (refer to Appendix III, Section 30.6). Completed PSimNet Message Buffer forms that map the specific PTS IOS parameters to SSTF Distributed Identifier Specification (DIS) terms will be included in the PSRD, Volume II. This information will be directly used in the definition of payload simulator-provided data that interfaces with the Real-Time Local Area Network (RT LAN) and dataset Identification (ID) registers.

7. Design Basic Payload IOS Display Formats. The basic complement of required displays for PTS operation from the IOS will be designed using the standards in SST-204, Volume 1, Integrated Training Facility (ITF) Human-Computer Interface (HCI) Style Guide and Standards, and Volume 2, ITF Full-Task Trainer (FTT) Instructor/Operator Station (IOS) Display Programming Rules for Real-Time Sammi Displays. Display development should address a priority approach that will begin work on the IOS displays that will contribute to PTS integration and checkout activities in the SSTF. Work on the remaining displays will continue during the integration process.

8. **Coordinate Display Development and Draft Specifications.** As preliminary display formats and support tables are developed, this information will be coordinated with the PDs and POIF personnel. This will be an iterative process. Over the display design timeframe, technical interface exchanges should occur to ensure agreement with display format, content, and capabilities.

9. **Build Basic Displays Using the SSTF Display Build Tool.** Display designs will be built using the standard SSTF tool (Sammi). Preliminary versions of the displays will be resident in the SSTF. Workstations for display building are located in JSC Building 5 South and JSC Building 4 South and may be located in other facilities.

10. **Test Basic Displays Using the CSIOP Payload Agent.** Integrated displays (format and data drivers) will be activated and tested with the respective CSIOP payload agent designated to support the respective facility class PTS. A payload agent test interface will allow data items to be altered, and the corresponding response will be observed on the display page being tested. The reverse will be true for items output from the display page. The response will be observed on the payload agent test interface. This step will verify that the display is connected to the correct variables (DIS terms) in the CSIOP application software.

11. **Identify Display Discrepancies and Document Problems.** As display pages are tested, a test log should be maintained that reflects satisfactory operation. The standard SSTF Trouble Report (TR) system will be used to document discrepancies. Hardcopies of noted discrepancies should be made and retained for problem correction.

12. **Correct Discrepancies and Retest Displays.** Problems identified on display pages will be analyzed for cause, and corrective action will be taken. Display pages will be retested and the display test log updated to reflect the current status. This process will be repeated as required to achieve proper performance.

13. **Test Displays Using the PTS.** After the PTS has been checked out and installed in the SSTF, IOS displays will be used to activate and operate it. The PTS must first respond to SSTF timing, synchronization, moding, and control from the SSTF operator station. When the PTS is verified to operate as part of the SSTF string, verification of the IOS displays can proceed. A display test procedure should be systematically followed with a record of correct or incorrect performance compiled. When an incorrect response is noted, data should be captured to help determine whether the discrepancy lies with the display or with the PTS. This step will verify that display variables are connected to the correct PTS variables.

14. **Identify Discrepancy Source as Display or PTS.** Problems identified by display page testing in the integrated environment must be analyzed to determine problem source and

to initiate corrective action. The problem may be a display problem, a PTS problem, or both.

15. **Correct Discrepancies and Retest Displays.** A retest should be scheduled and conducted when problem corrections for the displays have been made. For problems associated with the PTSs, a tag-up meeting should take place to coordinate the retest of the PTS and the display interface. Test procedure results should be recorded and retained.

16. **Baseline Displays for Training.** When the complement of displays for a PTS has been successfully tested, the displays should be baselined and placed under configuration management. Subsequent changes to the displays as a result of PTS design or sustaining engineering will be handled through the appropriate change control process.

20.4 NOTES

20.4.1 Acronyms and Abbreviations

COTS	Commercial Off-the-Shelf
CRT	Cathode Ray Tube
CSIOP	Crew Station Input/Output Processor
DIS	Distributed Identifier Specification
DT	Space Flight Training Division (Mail Code)
FTT	Full Task Trainer
HCI	Human-Computer Interface
I/O	Input/Output
ID	Identification
IOS	Instructor/Operator Station
ISS	International Space Station
ITF	Integrated Training Facility
JSC	Johnson Space Center
L	Launch
MSFC	Marshall Space Flight Center
NASA	National Aeronautics and Space Administration
NLT	No Later Than
PD	Payload Developer
PDC	Payload Development Center
PED	Payload Element Developer
POIF	Payload Operations Integration Function
PSID	Payload Simulator Interface Definition
PSimNet	Payload Simulation Network
PSRD	Payload Simulator Requirements Document
PTC	Payload Training Capability
PTS	Payload Training Simulator
PUDG	Payload User Development Guide
RT LAN	Real-Time Local Area Network
SSTF	Space Station Training Facility
TR	Trouble Report

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PAYLOAD USER DEVELOPMENT GUIDE (PUDG)

FOR THE

SPACE STATION TRAINING FACILITY (SSTF)

PAYLOAD TRAINING CAPABILITY (PTC)

APPENDIX III

SSTF-TO-PTS INTERFACE SPECIFICATION

CONTRACT NO. NAS9-18181, SCHEDULE C

29 August 2001

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30.1 INTRODUCTION

This document specifies the mechanical, electrical, logical, and thermal interfaces between the Space Station Training Facility (SSTF) and a Payload Training Simulator (PTS). The logical interface is used for simulation moding and control and for transferring model data between the SSTF host system and integrated PTS simulations. The specific model data will vary for each PTS and shall be defined by the Payload Developer (PD) by adding PTS-unique data to message layouts as specified in Section 30.6.

30.1.1 Identification

This is Appendix III, SSTF-to-PTS Interface Specification, of SSP-50323, Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC).

30.1.2 Purpose

The purpose of this appendix is to define the interface requirements sufficient for PTSs to be incorporated into and integrated with the SSTF PTC.

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30.2 APPLICABLE DOCUMENTS

The following documents in the exact issue shown form a part of this specification to the extent specified herein. Subtier documents referenced in the cited documents are not applicable unless referenced within this document. In the event of conflict between the documents referenced herein and the content of this document, this document shall be considered a superseding document.

ANSI/IEEE-STD-754-1985, IEEE Standard for Binary Floating-Point Arithmetic, 21 March 1985

D683-35455-1, User's Guide for the Suitcase Test Environment for Payloads (STEP), Revision A, 15 July 1998

EIA-RS-170, Electrical Performance Standards for Monochrome Television Studio Facilities, 11 November 1957

JSC-36250, Preliminary Hardware Design Specification for the Space Station Training Facility USA Vehicle Subsystem, Interim 4 Release, 31 January 1997

JSC-36250, Appendix VIII, Preliminary Hardware Design Specification for the Secondary Laboratory Crew Station Hardware Configuration Item Crew Stations Subsystem, 25 August 2000

JSC-36258, Preliminary Hardware Design Specification for the Video Switching and Distribution HWCI of the Visual Subsystem, 28 May 1997

MIL-STD-1553B, Interface Standard for Digital Time Division, Command/Response Multiplex Data Bus, Revision B, 21 September 1978 (updates to Notice 4, 15 January 1996)

MIL-STD-1777, Internet Protocol, 12 August 1983

MIL-STD-1778, Transmission Control Protocol, 12 August 1983

PTS User's Guide (to be published separately for each PTS)

RFC-768, User Datagram Protocol, J. B. Postel, 28 August 1980

RFC-791, Internet Protocol, J.B. Postel, 01 September 1981

RFC-793, Transmission Control Protocol, J.B. Postel, 01 September 1981

RFC-894, Standard for the Transmission of IP Datagrams Over Ethernet Networks, C. Hornig, 01 April 1984

SSP-30257:008, U.S. Standard Equipment Rack Standard Interface Control Document, Revision D, 20 June 1996

SSP-41002, International Standard Payload Rack to NASA/ESA/NASDA Modules Interface Control Document, Revision I, 15 July 1999

SSP-41017, Rack to Mini-Pressurized Logistics Module Interface Control Document, Part 1, Revision D, 10 April 2001; Part 2, Revision. F, 22 May 2000

SSP-52000-PAH-PRP, International Space Station Payload Accommodations Handbook, Pressurized Payloads, 31 August 1995

SST-115, Software Architecture Standard, Version 2.2, 03 November 1995

SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User's Guide for the Training Systems Contract, 31 March 2000

UNIX Programmer's Reference Manual (PRM), 4.3 Berkeley Software Distribution, Virtual Vax-11 Version, Computer Systems Research Group, Computer Science Division, University of California, Berkeley, CA, April 1986

30.3 INTERFACE DESCRIPTION

30.3.1 SSTF – PTS Architecture

The architecture of the SSTF as related to PTSs and integrated PTS interfaces to the SSTF are shown in Figure 30.3.1-1. The PDs are responsible for the software in the PTS computers. Although only one PTS is shown, the same SSTF interfaces apply to all PTSs included in a training session. For more information, refer to Section 4.

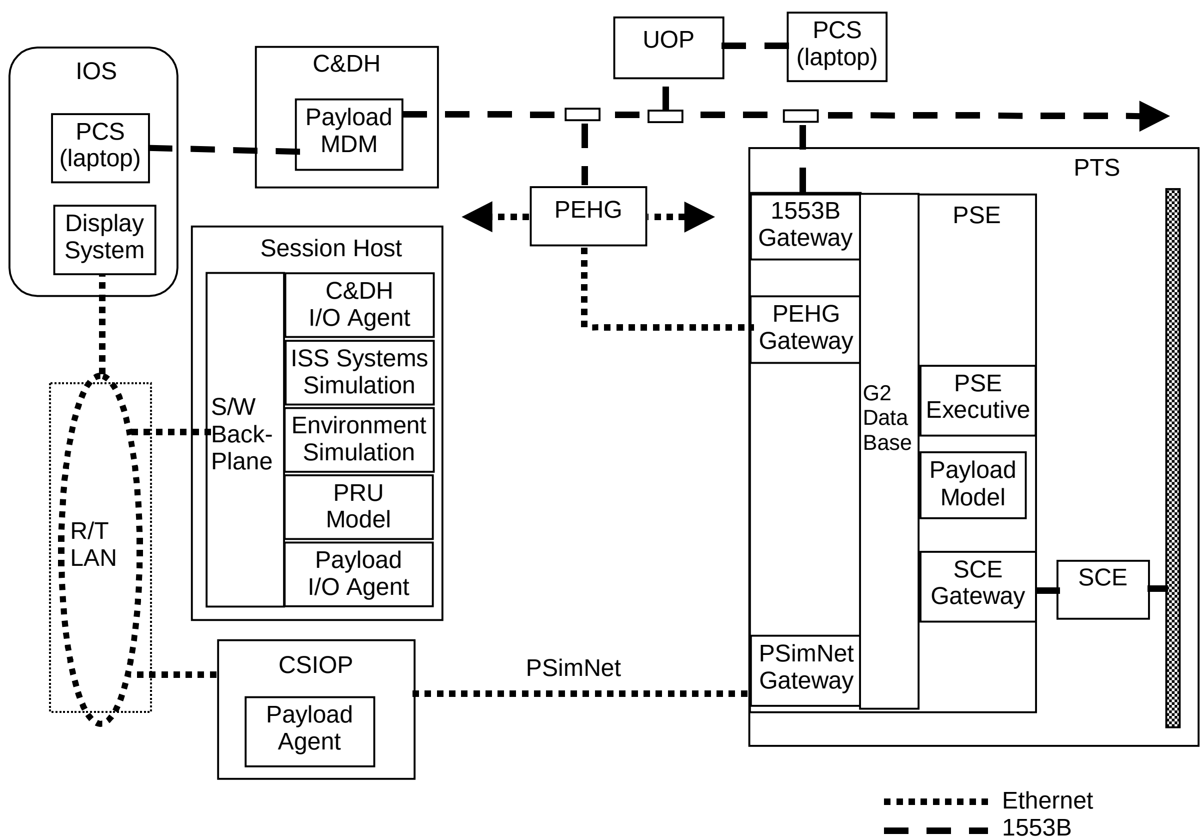

Figure 30.3.1-1 SSTF – PTS Architecture

The SSTF computers contain simulation control software, simulation models of the environment and International Space Station (ISS) systems, Flight Software (FSW) running in emulated Multiplexers/Demultiplexers (MDMs), the SSTF payload agent, and the Payload Resource Utilization (PRU) models. The SSTF Command and Data Handling (C&DH) simulation communicates with PTSs via MIL-STD 1553B payload buses.

The Crew Station Input/Output Processor (CSIOP) provides a simulation-unique interface between the SSTF and the crew station/PTSs. The Payload Simulation Network (PSimNet) Local Area Network (LAN) is the communication link between the CSIOP and each integrated PTS. It provides for moding and control of the PTSs and for exchanging simulation model data between the SSTF simulation models and Instructor/Operator Stations (IOSs) (through the CSIOP) and each PTS integrated into the training session. The SSTF payload agent communicates with the CSIOP payload agent, which, in turn, communicates over the PSimNet LAN with the Payload Simulator Environment (PSE) PSimNet Gateway.

The SSTF Real-Time Sessions (RTS) system provides distributed timing services using the Central Timing Equipment (CTE), including maintaining values for Greenwich Mean Time (GMT) and Simulated Greenwich Mean Time (SGMT), which are provided to each PTS integrated into the training session via the PSimNet. GMT is the actual time at which the training session is occurring. SGMT represents the time in the universe being modeled by the SSTF training session.

The PRU model provides the core systems with basic payload resource consumption data at the rack level for those rack locations that do not have PTSs configured into the training session and for attached payloads.

30.3.2 PTS Architecture

All Class IIb and Class IIIb PTSs are required to be based on a PSE platform. The PSE is a low-cost Personal Computer (PC)-based simulation environment with provisions for rapid development of simulation models. It includes implementation of the PTS side of the interfaces and instructional features described in Section 30.3.3. It also includes G2, a Commercial Off-the-Shelf (COTS) product of GynSym Corporation, which provides an expert system development environment that uses graphic representation and structured English rule bases to facilitate development of payload models by subject matter experts.

For PTS development, the PSE computer will be provided as a combined PSE and Simulator Test Fixture (STFx) system. The STFx software provides an implementation of many of the SSTF capabilities. It supports the SSTF side of the PSimNet interface and includes an interface to control operation of a Suitcase Test Environment for Payloads (STEP), which provides C&DH interfaces. It includes a limited fidelity model of SSTF core systems. It includes user displays to send control commands via the PSimNet to the PTS and provides a capability to execute predefined test scripts. The STFx function will be available to a PD to assist in PTS development. The STFx will also be used at the SSTF for testing PTSs and to provide a Standalone Payload Training Capability (SPTC). Many of the references to SSTF interfaces to PTSs also apply to the STFx or STEP.

For additional information about the PSE and STFx, refer to Appendix IV, Section 40.3.1, Appendix V, and SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User’s Guide for the Training Systems Contract. For additional information about the STEP, refer to D683-35455-1, User’s Guide for the Suitcase Test Environment for Payloads (STEP).

Each integrated PTS computer will communicate with the SSTF C&DH string through the MIL-STD-1553B bus and may communicate with other integrated PTSs and with Portable Computer Systems (PCSs) connected to Utility Outlet Panels (UOPs) through the Payload Ethernet LAN and the Payload Ethernet Hub Gateway (PEHG). The SSTF-unique PSimNet provides the simulation control and model message interface to the SSTF.

Optional Signal Conversion Equipment (SCE) interfaces provide for payload control panels and other payload equipment that may be monitored or controlled by the PTS computer. Other computer devices such as an aural cue subsystem or video playback subsystem may be added by the PD.

The monitor, keyboard, and mouse provided with the PSE system are to be used for offline system management, software support, and diagnostic testing. They may not be used when the PTS is connected to the SSTF and supporting a training session unless it is providing a virtual panel for the PTS.

The PTS integrated into a training session will receive time values for GMT and SGMT periodically via the PSimNet. The PTS may also receive a broadcast time from C&DH via the 1553B. If so, the PTS shall maintain a value of FSW Perceived GMT based on the time value received. Modeling of any payload processing based on the time received from FSW shall use the FSW Perceived time. Modeling of any payload processing that is dependent on actual real time or actual elapsed time shall use the SGMT value received via the PSimNet.

30.3.3 SSTF/PTS Interfaces

Communication between the SSTF and integrated PTSs is accomplished by the ISS flight 1553B interfaces and the SSTF PTC-unique PSimNet Ethernet interface. All integrated PTSs shall comply with interface specifications given in Section 30.4. The specification for the Simulation Control message in Section 30.4.2.3.3.1 lists modes applicable to PTSs. Information about how the PTS mode transitions are initiated and how the PTS shall respond to messages specifying each of the modes is given in Section 30.3.3.5.2.

30.3.3.1 PTS Interfaces to SSTF Core Systems

Each integrated PTS shall satisfy a minimum set of core systems interfaces. These interfaces are described in the following sections from a PTS point of view. Data as indicated will be exchanged via the PSimNet. Note that if an STFx is used with a PTS, it will provide values as specified for the SSTF and the PTS shall send values to the STFx as indicated.

A defined set of SSTF-to-PTS data will be periodically provided to each PTS integrated into the training session; however, the PTSs can ignore any irrelevant data. A defined set of PTS-to-SSTF data shall be periodically provided, although some of the data values may be zero. All data will be exchanged at a 1-hertz rate.

30.3.3.1.1 EPS Interface

Figure 30.3.3.1.1-1 shows the interfaces required for the SSTF Electrical Power System (EPS) simulation. It is expected that the PTS simulation model will use the SSTF simulation values for DC voltage on the main and auxiliary buses to calculate the power consumption in watts for each bus. The normal range of the voltage values is 123 to 126 VDC, with a nominal value of 124.5 VDC. The values for either bus or both buses may be zero to indicate power off depending on the training configuration and malfunctions introduced into the system. The simulated voltage values will be sent via the PSimNet to the PTS at a 1-hertz rate. The PTS shall send the simulated values for power usage in watts on each bus via the PSimNet to the SSTF at a 1-hertz rate.

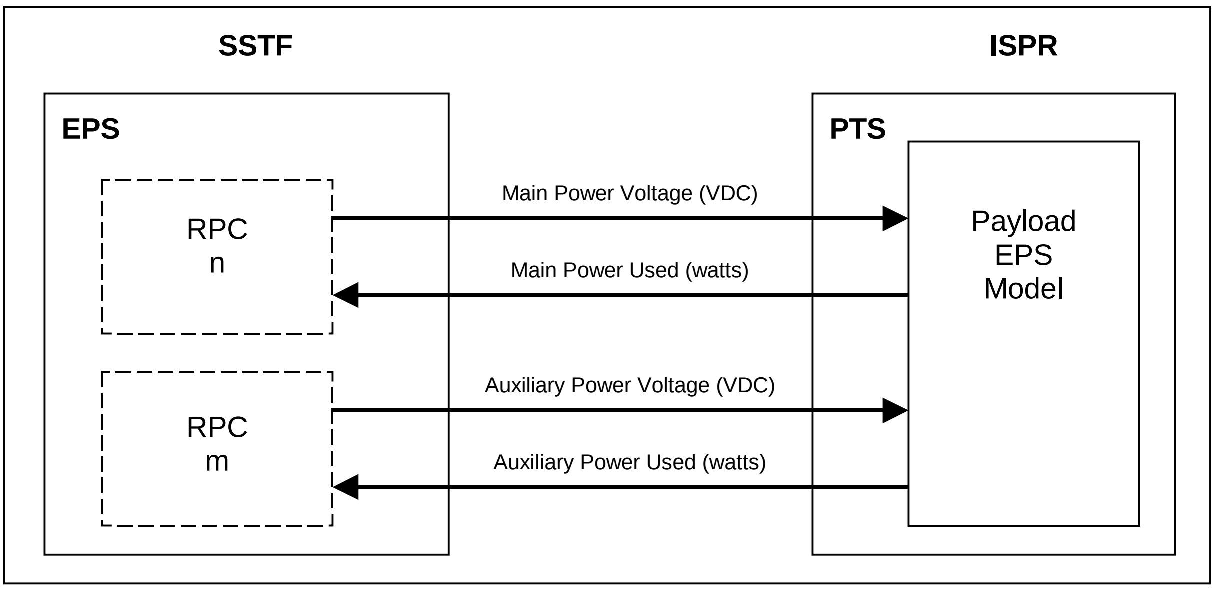

Figure 30.3.3.1.1-1 EPS Core System Interfaces

30.3.3.1.2 TCS Interface

Figure 30.3.3.1.2-1 shows the interfaces required for the SSTF Thermal Control System (TCS) simulation. It is expected that the PTS simulation model will use the available SSTF simulation values for coolant temperatures and flow rates for the low temperature and moderate temperature coolant loops to calculate the heat added to each loop. The TCS simulation model will provide simulation values for both the low and moderate loop inlet coolant temperatures in degrees Fahrenheit and flow rate in lb/sec via the PSimNet at a 1-hertz rate. The normal range of the low temperature coolant temperature is 38° to 42° F, with a nominal value of 40° F. The normal range of the low temperature flow rate is 0.03 to 0.25 lb/sec, with a nominal value of 0.09 lb/sec. The normal range of the moderate temperature coolant temperature is 61° to 65° F, with a nominal value of 63° F. The normal range of the moderate temperature flow rate is 0.03 to 0.21 lb/sec, with a nominal value of 0.08 lb/sec. The flow rates for either loop or both loops may be zero to indicate coolant is not available, depending on the training configuration and malfunctions introduced into the system.

The PTS shall send the following simulation values via the PSimNet to the SSTF at a 1-hertz rate:

a. The amount of heat, in Btu/sec, that is added into both the low and moderate coolant loops

b. The simulation values for the moderate coolant loop control valve in which the position of this control valve can range from fully closed (0.0) to fully open (1.0)

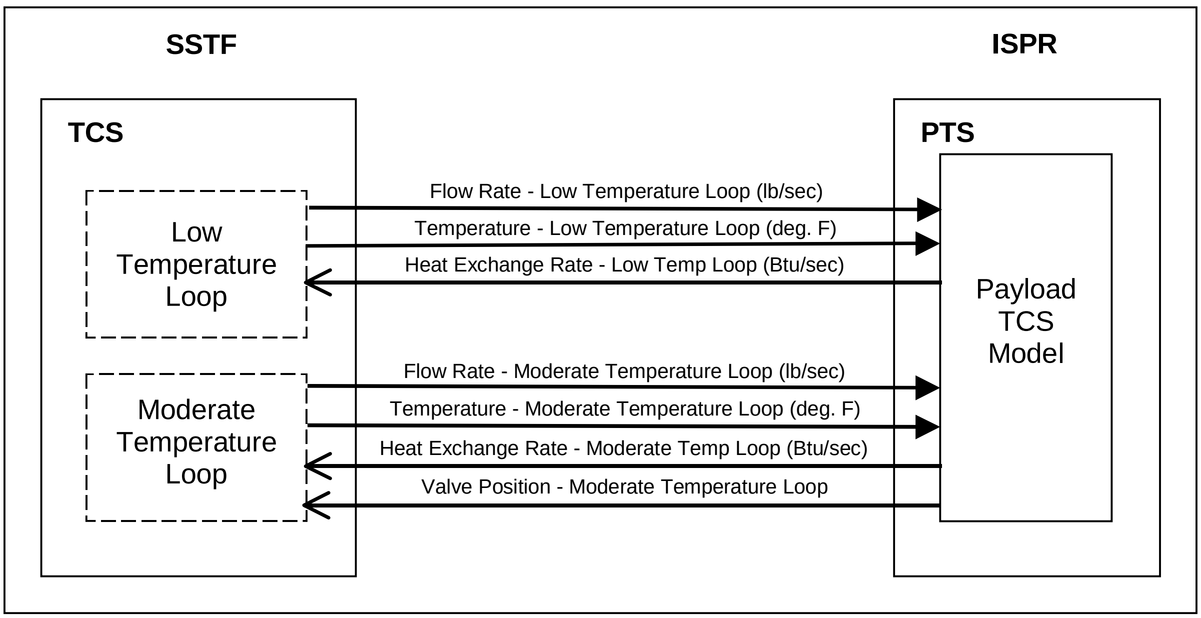

Figure 30.3.3.1.2-1 TCS Core System Interfaces

30.3.3.1.3 ECLSS Interface

Figures 30.3.3.1.3-1 through 30.3.3.1.3-3 show the interfaces required for the SSTF Environmental Control and Life Support System (ECLSS) simulation.

Figure 30.3.3.1.3-1 focuses on the simulated effects of the payload on the cabin temperature. The SSTF ECLSS model will provide simulation values for the cabin temperature in degrees Fahrenheit and for the cabin pressure in psi via the PSimNet at a 1-hertz rate. The normal range of cabin temperature values is 65° to 80° F, with a nominal value of 70° F. The normal range of cabin pressure values is 14.2 to 14.9 psi, with a nominal value of 14.5 psi. The PTS shall send the simulation value for the amount of heat flow to the cabin atmosphere in Btu/sec via the PSimNet at a 1-hertz rate.

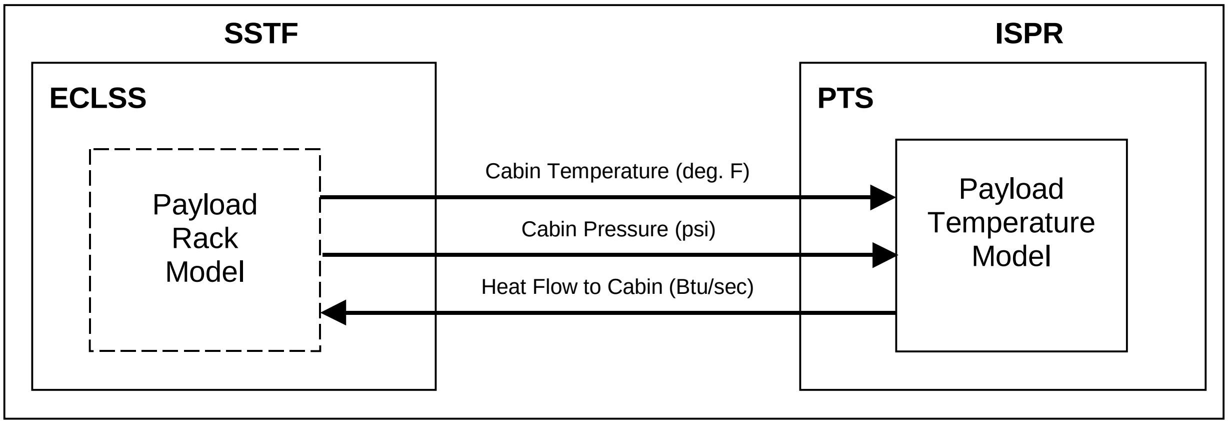

Figure 30.3.3.1.3-1 ECLSS Core System Interfaces (Cabin Temperature)

Figure 30.3.3.1.3-2 addresses the Laboratory Nitrogen System (LNS) interface. The SSTF ECLSS model will send the simulation value for Lab nitrogen pressure in psi via the PSimNet at a 1-hertz rate. The normal range of the Lab nitrogen pressure is 88 to 120 psi, with a nominal value of 100 psi. The value may be zero to indicate Lab nitrogen is not available depending on the training configuration and malfunctions introduced into the system. The PTS shall send the PTS simulation value for the amount of nitrogen used, measured in lb/sec, via the PSimNet at a 1-hertz rate.

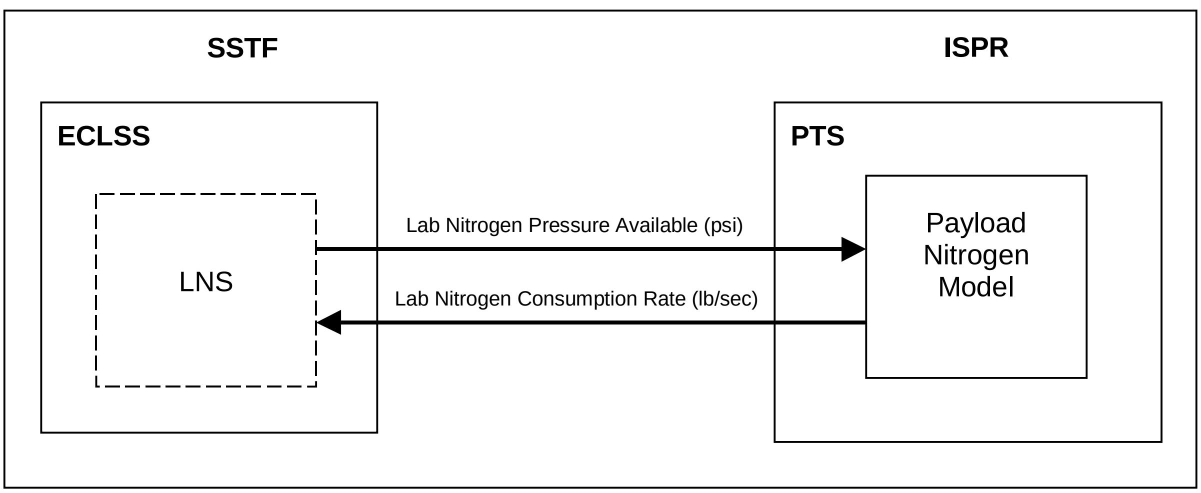

Figure 30.3.3.1.3-2 ECLSS Core System Interfaces (Nitrogen)

Figure 30.3.3.1.3-3 addresses the vacuum and waste gas interfaces. The SSTF ECLSS model will send a simulation value for the vacuum resource level measured in psi via the PSimNet at a 1-hertz rate. The nominal value of the vacuum resource pressure is 1.5×10^{-5} psi. The value may be zero to indicate vacuum resource is not available depending on the training configuration and malfunctions introduced into the system. The PTS shall send the simulation value for the amount of the vacuum resource consumed as a flow rate measured in lb/sec via the PSimNet at a 1-hertz rate. The ECLSS model also sends the simulation value for the vacuum exhaust level for waste gas removal, measured in psi via the PSimNet at a 1-hertz rate. The waste gas is modeled as 100-percent nitrogen. The nominal value of the vacuum exhaust pressure is 1.5×10^{-5} psi. The value may be zero to indicate vacuum exhaust is not available depending on the training configuration and malfunctions introduced into the system. The PTS shall send the simulation value for the amount of waste gas removed from the payload as a flow rate measured in lb/sec via the PSimNet at a 1-hertz rate.

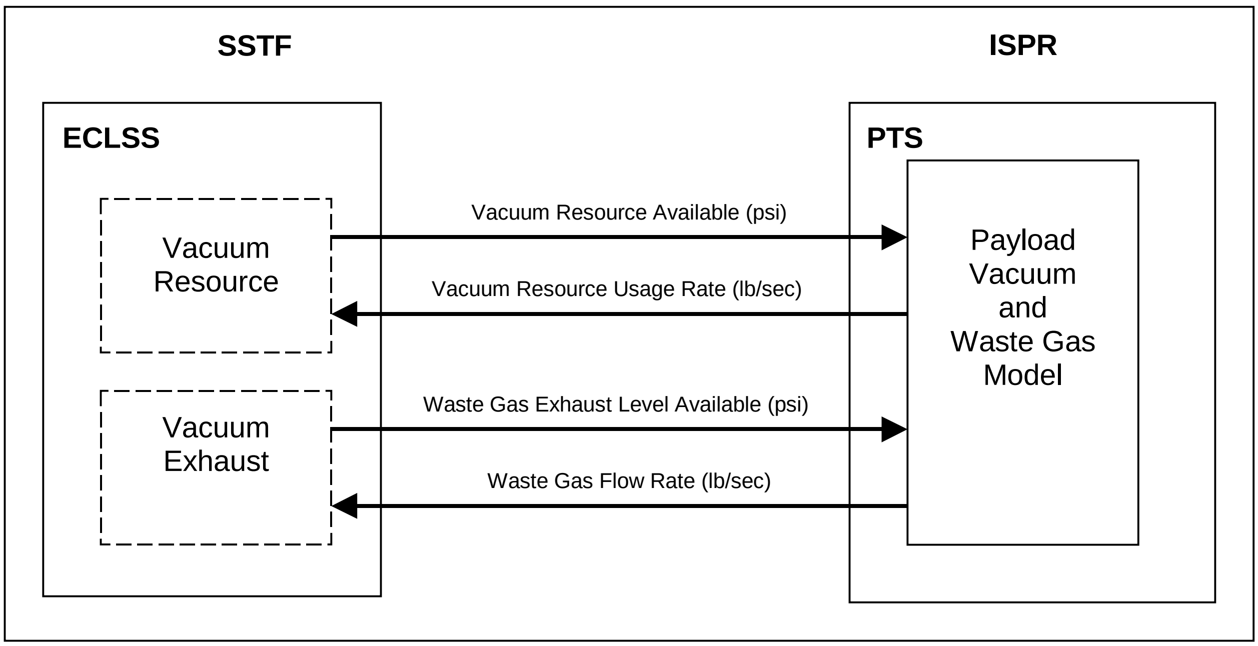

Figure 30.3.3.1.3-3 ECLSS Core System Interfaces (Vacuum)

30.3.3.2 PTS Interfaces to Simulated ISS Onboard C&DH Equipment

The Onboard Computer System (OBCS) uses a combination of hardware and software to provide a full-system signature simulation of the ISS onboard C&DH system and its interface components to support PTS interfaces to simulated ISS onboard C&DH equipment. Refer to Section 4.5.1 for a description of the OBCS simulation.

30.3.3.2.1 C&DH System

The SSTF uses actual C&DH flight software hosted in emulated MDMs. These MDMs are connected through flight-equivalent 1553B buses. One PTS interface is provided for each crew station element rack location.

Any PTS using C&DH services provided by the Payload Executive Processor (PEP) shall interface to the SSTF PEP emulator through a Remote Terminal (RT) interface on a payload 1553B bus. The PTS configuration shall match the configuration data tables in PEP flight software with respect to bus number, RT address, subset Identification (ID), etc.; otherwise, the results will be undefined. The PSE computer uses a value for the 1553B RT address defined in a configuration file that can be edited when the PTS is not connected to an active training session.

The SSTF PEPs will execute ISS flight software, command and control payloads, and provide services to payloads as described in the ISS documents. Exceptions to these services in the SSTF relate to limitations on simulation of the High-Rate Data Link (HRDL). The OBCS simulation does not include the HRDL interface (including the Transparent Asynchronous Transmitter/Receiver Interface (TAXI) for payload-to-payload communications or payload downlink through Ku-band) to PTS.

The PTSs shall provide simulated health and status data to PEP flight software that will be transferred to and decommutated at the Marshall Space Flight Center (MSFC) Payload Operations Integration Center (POIC). The format and protocol shall be equivalent to the ISS flight data. The fidelity of this health and status data shall be determined by the Training Strategy Team (TST).

The PTS shall process time broadcast messages from flight software received via the 1553B and maintain a value of FSW Perceived GMT based on the time value received. The value of the FSW Perceived GMT, formatted as a time variable type as specified in Section 30.4.2.3, will be included in Format 1 of the PTS Data message. Modeling of any payload processing based on the time received from FSW shall use the FSW Perceived time. Modeling of any payload processing dependent on actual real time or actual elapsed time shall use the SGMT value received via the PSimNet.

30.3.3.2.2 PEHG

The payload Ethernets and emulations of the hub function of the PEHGs support communications among integrated PTSs and between integrated PTSs and Ethernet laptops (PCSs) connected to UOPs. The medium-rate data link between racks is available for use by PTSs using the same interfaces and protocols as the ISS flight payloads being simulated. The medium- to high-rate telemetry gateway of the PEHG is not simulated. Gateway-addressed packets entering the simulated PEHG are discarded.

30.3.3.3 Interface Software to Support Core Systems Interfaces

30.3.3.3.1 SSTF Payload Interface Agent

The SSTF payload interface agent resides in the session host. If the CSIOP is not integrated into the training session, the SSTF payload interface agent will use PRU data for all payloads. If the CSIOP is integrated into the training session, it collects model data from the various host simulation models and forwards this data to the CSIOP payload agent for distribution to the appropriate PTSs. The SSTF payload interface agent receives payload data from the CSIOP payload agent and distributes the data to the host simulation models. It also identifies those payloads that do not presently have a PTS active so that the SSTF payload interface agent will use PRU data for them.

30.3.3.3.2 CSIOP Payload Agent

The CSIOP payload agent resides in the CSIOP. It is the “middle man” that interprets simulation control messages from the SSTF and sends corresponding PSimNet messages to the applicable PTSs. For example, a malfunction message would cause a Malfunction Control message to be directed to a specific PTS, but a moding command message would cause Simulation Control messages containing the new mode to be directed to all PTSs. The CSIOP payload agent also exchanges simulation data between each PTS and the SSTF.

SSTF operation procedures require an asset to be in the ready state and waiting for the Add command before that asset can be added to a training session. This procedure also applies to establishing communication with a PTS. Hence, all integrated PTSs scheduled for a training session must be started first and waiting for the CSIOP to establish communication with them. After all ready PTSs have established communications with the CSIOP, the CSIOP is ready to be configured into a training session. Similarly, when the CSIOP is dropped, communication with the PTSs continues so that the PTSs can be shut down in an orderly manner or restarted, possibly in another training session.

30.3.3.3.3 PSE PSimNet Gateway

The PSE PSimNet gateway receives simulation monitoring and command messages and host simulation model data from the CSIOP payload agent for distribution to the PTS software systems. The PSE PSimNet gateway also collects payload data messages for packaging and sending to the SSTF through the CSIOP payload agent.

30.3.3.4 Interface Terms

Simulation terms are distributed throughout the SSTF complex. Simulation terms originating in either the SSTF or a PTS that are transmitted over the PSimNet must be clearly defined so that both the sender and receiver(s) can interpret the data correctly. This is accomplished through the PSimNet message layouts defined in Section 30.6 and its subsections and the use of the Distributed Identifier Specification (DIS) system. The DIS system is a distributed database system that is hierarchically accessed. It is used when a training session is being established to locate and bind those terms that are applicable to that training session. The DIS is described in Sections 3 and 4.4 of SST-115, Software Architecture Standard.

A set of DIS terms for data parameters to be transferred across the PSimNet will be defined for each crew station element ISPR rack location. PSimNet messages used to transfer the data are defined in Section 30.4.2.3 and message layouts are defined in Section 30.6. DIS terms will be defined as follows:

a. DIS terms for values to be transferred cyclically from the SSTF host system to each PTS using the Station Data message are specified in Table 30.6-I.

b. DIS terms for values to be transferred cyclically from each PTS to the SSTF host system using Format 1 of the PTS Data message are specified in Table 30.6-II.

c. DIS terms for data parameters to be transferred from each PTS to the SSTF so they are available for display at an IOS are specified in Tables 30.6-III, 30.6-IV, 30.6-V, and 30.6-VI. These parameters are transferred cyclically at a 1-hertz rate in Formats 2, 3, 4, and 5 of the PTS Data message and are available to contain data values as defined for each PTS.

d. DIS terms for data parameters to be transferred from the SSTF to a PTS to contain data values updated at an IOS are specified in Table 30.6-VII. These parameters are transferred asynchronously from the SSTF to a PTS in a Poke message whenever any of the values are changed. The same DIS terms are used to initialize values whenever a Data Reset message containing parameters specified in Table 30.6-VIII is sent asynchronously from a PTS to the SSTF. The use of these parameters is as defined for each PTS.

e. DIS terms for data parameters to be transferred from the SSTF to each PTS to communicate malfunction information are specified in Tables 30.6-IX, 30.6-X, and 30.6-XI. A Malfunction Control message with one of the formats shown will be sent asynchronously whenever any of the values defined for the format are changed. The use of these parameters is as defined for each PTS.

30.3.3.5 SSTF Instructional Features Related to PTSs

The SSTF has a rich set of instructional features. This section briefly describes those with which PDs would normally be concerned. Some PTSs may not implement all of these features. The instructional capabilities required for each PTS are determined by the TST.

30.3.3.5.1 Simulation Monitoring

Simulation exercises are monitored at an IOS or STFx using previously built display pages.

30.3.3.5.2 Simulation Control

An SSTF training session is initiated from an IOS. Assets (crew station elements, IOSs, etc.) are added to a training session via commands prior to starting the training exercise. Training sessions that include PTSs in a crew station element require that the CSIOP for the crew station element be included as an asset. Before the CSIOP asset is added to the SSTF training session, all devices connected to that CSIOP (crew station element devices, PTSs, etc.) must be connected to and communicating with the CSIOP.

In preparation for being added to an SSTF training session, a PTS should have all PTS control panels properly configured and the PTS software loaded and running in a quiescent (Ready) state. The CSIOP establishes connections between the SSTF and PTSs in the training session as specified in Section 30.4.2.3.2 and the CSIOP asset is ready to be added into the SSTF training session.

The following sections identify the SSTF control commands, also known as moding commands, and describe their functionality. During a training session, the CSIOP payload agent responds to the control commands and sends Simulation Control messages as defined in Section 30.4.2.3.3.1 with the mode field set to a value corresponding to the command. The PTS shall respond as specified below. The STFx provides similar functionality for monitoring and control of a PTS during an SPTC session.

30.3.3.5.2.1 Run

The Run command directs the training session to transition to Run mode. In Run mode, the simulation is progressing in real time. Simulation values for consumables and state variables are updated to represent changes as they would occur in the corresponding ISS flight element. When the CSIOP enters Run mode, it will send a Simulation Control message to each PTS specifying Run mode. The PTS shall respond with a Simulation Control Acknowledgment message and activate its real-time simulation.

30.3.3.5.2.2 Freeze

The Freeze command directs the training session to transition to Freeze mode. In Freeze mode, the simulation is frozen in time. Simulation values for consumables and state variables are held constant. In other words, the integration factor, delta time, is set to zero. Simulation models are generally cycling and continue to respond to instructor inputs and panel switch changes. When the CSIOP enters Freeze mode, it will send a Simulation Control message to each PTS specifying Freeze mode. The PTS shall respond with a Simulation Control Acknowledgment message and enter Freeze mode as described above.

30.3.3.5.2.3 Initialize

The Initialize command directs the training session to initialize as determined by the selected Initial Conditions (IC) point (also known as a Datastore point). Initialize is sometimes referred to as Return to Datastore. It is considered a transitory simulation mode. The training session will remain in the transitory initialize mode until all assets have completed their initialization process, or until a timeout (60 seconds) occurs.

The CSIOP will send a Simulation Control message to each PTS specifying Initialize mode, including the IC number saved for the PTS, if any. PSE software will immediately respond with a Simulation Control Acknowledgment message and initialize to the IC point indicated. Variables saved in the IC file will be stored in the G2 database and a PSimNet Data Reset message will be sent to the CSIOP to initialize all Enterable variables. When initialization is complete, PSE software will send a Simulation Control Initialization Complete message to the CSIOP and enter Hold mode. If the SSTF IC point selected does not include an IC number for the PTS, a value of zero will be sent. Each integrated PTS should define an IC point numbered zero to establish an initial condition for the PTS, generally a default, non-powered state.

Because the PTSs are considered to be included in the CSIOP asset, the CSIOP will not report initialization complete until all active PTSs have reported that their initialization is complete by sending a Simulation Control Initialization Complete message to the CSIOP, or a timeout (60 seconds) occurs. The CSIOP will send Malfunction messages to initialize all Malfunction variables to the values currently in effect in the SSTF. The training session will automatically enter Freeze mode on completing the initialization process and the CSIOP will send Freeze commands to all PTSs in the session.

IC points may be created through Datastore as described in the following section or by other means. It is recommended that each integrated PTS include at least two IC points. Point number zero should be as defined above and point number one should be a condition of nominal operation. The PD should consider creating other IC points that correspond to major events in the life cycle of the payload.

The PSE includes an alternative method for an instructor to request initialization to a specified IC point. The instructor may set Enterable Integer_8 - 40 (refer to Table 30.6-VII) to the value to be used for the IC point. When the PSE receives the Poke command with the value, it will initialize to the value specified.

30.3.3.5.2.4 Datastore

The Datastore command directs the training session to create an IC point representing the state of the simulation exercise at the time. IC points are named and stored in a file for subsequent retrieval by an Initialize command.

Datastore can only be commanded in Freeze. The training session will remain in the transitory Datastore mode until all assets have completed their Datastore process, or until a timeout (60 seconds) occurs. The training session will then return to Freeze. The PSE includes implementation of the Datastore feature. The CSIOP will send a Simulation Control message specifying Datastore mode to all PTSs. PSE software will immediately respond with a Simulation Control Acknowledgment message and create a Datastore file with a name including the value of the Next_IC_Num last sent to the CSIOP. The Datastore file shall include values of critical parameters that sufficiently describe the condition of the PTS system so that, when those parameters are restored to the saved values at some later date/time, the PTS state/operation is recovered and the training session can be continued at the same point in the mission timeline. It shall include, as a minimum, those model state terms required to return to the payload status and to restore the utilization of SSTF core systems resources at the time the Datastore was commanded. The PSE will also save the values for all Enterable Data variables so they can be sent to the CSIOP in a Data Reset message. The PTS may optionally capture malfunction states, but that is not necessary since the CSIOP will send Malfunction messages during initialization to set all Malfunction variables to the value then in effect in the SSTF. When the Datastore is complete, the PTS shall send a Simulation Control Datastore Complete message to the CSIOP and enter Hold mode. It is recommended that sufficient disk space be configured on each integrated PTS to store a minimum of 100 Datastore points.

Each Datastore point must represent a consistent set of IC points across all assets and simulators in the training session. This will be accomplished by associating each PTS IC point number with the corresponding SSTF Datastore data. Each integrated PTS is expected to maintain a cache of usable IC numbers. At initialization and after each Datastore, each PTS shall provide the next IC number to the CSIOP payload agent. When a Datastore is performed, the set of numbers for corresponding PTS IC points will be recorded along with the SSTF Datastore data. When the SSTF returns to an IC point, the CSIOP payload agent will inform each PTS of the matching IC number. If an IC number was not stored for a PTS, the number passed to the PTS will be zero, indicating that the IC point defined to establish an initial condition for the PTS should be used. The PSE includes maintenance of IC numbers as required.

30.3.3.5.2.5 Safestore

Safestore is a feature of the SSTF that enables the current training session to be restarted at a recent point in time if the session terminates abnormally. Safestore software periodically records time-dependent data in real time. The default recording interval is 15 minutes. Safestore cannot be commanded from an IOS, but the IOS can be used to change the Safestore interval from the default value. The CSIOP payload agent will detect when the SSTF is automatically taking a Safestore point and send a Simulation Control message specifying Safestore mode and the Safestore number to each PTS. PSE software will immediately respond with a Simulation Control Acknowledgment message, record Safestore data, store it in the specified Safestore dataset, and continue operating in the mode in effect when the Simulation Control message was received.

The last four Safestore points are retained during a training session and are available if the session terminates abnormally. Safestore data is not retained when a training session terminates normally. After a training session abnormally terminates, one of the Safestore points can be selected to be used to restore the session. The session will be initialized to the closest previous Datastore point and the Safestore data will be overlaid on it.

30.3.3.5.2.6 Return to Safestore

The Return to Safestore command causes the selected Safestore data to be applied to the associated Datastore point in order to return the training session to the point at which the Safestore was taken. The CSIOP will send a Simulation Control message specifying Return to Safestore mode and the Datastore and Safestore numbers to all PTSs to inform them of the request to reinitialize to the specified Safestore point. Each PSE will immediately respond with a Simulation Control Acknowledgment message, perform initialization as specified in Section 30.3.3.5.2.3, apply the specified Safestore data, send a Simulation Control Return to Safestore Complete message to the CSIOP, and enter Hold mode. When all active PTSs have sent Simulation Control Initialization Complete messages to the CSIOP or 60 seconds has elapsed, the CSIOP will send Malfunction messages to initialize all Malfunction variables to the value currently in effect in the SSTF. The training session will automatically enter Freeze mode on completing the initialization process, and the CSIOP will send Freeze commands to all PTSs in the session.

30.3.3.5.2.7 Terminate

The Terminate command stops the simulation exercise in an orderly manner. The Terminate command will cause the CSIOP to send a Simulation Control message specifying Terminate mode to all PTSs. Each PTS shall immediately respond with a Simulation Control Acknowledgment message, stop executing the payload models in real time, terminate the connection to the CSIOP and training session, and return to a Ready state waiting for further commands from the CSIOP.

30.3.3.5.2.8 Hold

The Hold command informs the PTSs that the training session has temporarily suspended real-time execution and the communication between the CSIOP and PTSs may be suspended for an indefinite period of time. The Hold command will cause the CSIOP to send a Simulation Control message specifying Hold mode to all PTSs. Each PTS shall immediately respond with a Simulation Control Acknowledgment message, enter a suspended state of execution, and wait for communication to resume. Normally, the next message will be a Simulation Control message, but it could be a Connect command to reestablish communication.

30.3.3.5.3 Look and Enter

Simulation terms may be viewed and/or changed at an IOS or STFx if the term is properly registered with the DIS system. PTS terms as specified in Tables 30.6-II through 30.6-VI shall be sent to the SSTF host system in PTS Data messages as described in Section 30.4.2.3.5 to be available for viewing whether or not they are currently being viewed. Terms specified in Table 30.6-VII will available for viewing and may be changed at an IOS or STFx as described in Section 30.4.2.3.8. Their values will be initialized by a Data Reset message sent by the PSE during a Return to Datastore. They will be sent by the SSTF host system or STFx to the appropriate PTS in Poke messages only when one or more of the values has been changed by an

IOS entry. Note that the parameter Enterable Integer_8 - 40 has a special use by the PSE as defined in Section 30.3.3.5.2.3.

30.3.3.5.4 IOS Display Pages

IOS display pages provide the instructor with visibility and control of the components of a training session including the PTSs. These display pages are prepared using Sammi, a COTS product of Kinesix Corporation, which runs under X-Windows/Motif. The NASA Johnson Space Center (JSC) Space Flight Training Division (DT) is responsible for preparing and maintaining these pages. The steps in the IOS display development process are described in Appendix II.

PTS terms referenced in an IOS display page may be chosen from the DIS terms for data parameters defined in Tables 30.6-II through 30.6-VI to be transferred from each PTS to the SSTF and the Enterable Data parameters defined in Table 30.6-VII.

30.3.3.5.5 STFx Display Pages

STFx display pages allow the PD to monitor and control the PSE system in a combined PSE/STFx during development and test. STFx displays in an STFx-only system can be used for checkout of a PSE and to monitor and control the PTS during an SPTC session. STFx display pages are prepared using the combined PSE/STFx software and the G2 Graphical User Interface (GUI). The PD is responsible for developing STFx displays they require for development and test of their PTS. The POIF Simulation Engineers and the NASA JSC DT organization are responsible for preparing and maintaining STFx displays as described in Appendix II.

PTS terms referenced by an STFx display page may be chosen from the data parameters defined in Tables 30.6-II through 30.6-VI to be transferred from each PTS via the PSimNet and the Enterable Data parameters defined in Table 30.6-VII.

30.3.3.5.6 Parallel Switch Override

Parallel Switch Override (PSO) is an SSTF capability to override panel switch values from the IOS instead of physically changing the switches on the panel. It is useful when no one is readily available to physically change a switch or when a switch is absent or broken. PSO works in conjunction with the SSTF panel pages. PSO is not included in the PSE and is not required for any PTS unless specifically determined by a payload-specific TST. If PSO capability is required, existing capabilities for transferring PTS data to the SSTF and for entering values at an IOS to be sent to a PTS shall be used.

30.3.3.5.7 Switch Scan

Switch Scan is an SSTF capability to perform a configuration check of specified panel switch positions against a predetermined list for the selected IC point and to identify all switches that are out of configuration. It normally executes at the conclusion of the initialization process. Switch Scan is not included in the PSE and is not required for any PTS unless specifically determined by a payload-specific TST. If Switch Scan support is required, existing capabilities for transferring PTS data to the SSTF for viewing at an IOS shall be used. Note that Group Digital Input (DI) parameters are included in the buffer layout defined in Table 30.6-VI for switch positions and desired switch positions.

30.3.3.5.8 Simulator Event Recording

Simulator Event Recording (SER) records IOS inputs that affect the simulation and crew station inputs on a timeline basis. This information can be examined during the training debriefing or can be processed with software tools.

No provisions have been made for the SSTF or STFx to record PTS terms.

30.3.3.5.9 Scripting

Scripts provide the instructor with the capability to automatically perform instructor and/or student actions that affect the simulation at predetermined times. Scripts are stored on the SSTF and initiated at the SSTF IOSs. Setting of values for PTS switches may be included in the SSTF scripts. The STFx includes a similar scripting capability. The PD need not be concerned with scripting, since it is a part of the SSTF and STFx instructional features and will inherently be extended for use with PTSs.

30.3.3.5.10 Simulated Malfunction Insertion/Removal

Failures are simulated by introducing preplanned malfunctions into the simulated payload models. The SSTF malfunction system accepts predefined malfunction identifiers and any associated parameters at an IOS page and passes this data to the targeted simulation model. Three categories of integrated PTS malfunctions are defined in Section 30.4.2.3.6. PTS malfunctions are associated with PTS model parameters using the message layout forms in Tables 30.6-IX, 30.6-X, and 30.6-XI.

Simulated failures of payload operations are part of the PTS model and are the PD’s responsibility. The SSTF provides the instructor with the mechanism to activate and deactivate these malfunctions.

SSTF IOS pages that display crew station values (valves, indicators, etc.) affected by a malfunction show both the normal value and the value resulting from the malfunction for that display. In order for PTS-specific IOS displays to show both the normal display value and the malfunctioned display value, they must be associated with PTS data parameters included in Tables 30.6-III through 30.6-VI.

30.3.3.6 Interface Protocols

All integrated PTSs shall incorporate the PSimNet protocols as described in this section. The PSE includes the PSimNet protocol as described in this section, so the PD need not be concerned with details of the implementation. The 1553B bus and PEHG interfaces are equivalent to the real world and are not covered here.

30.3.3.6.1 Data Transmission Protocol

The Internet Protocol Suite (IPS), which is also known as the Transmission Control Protocol/ Internet Protocol (TCP/IP) protocol suite, is used for the underlying routing and transport functions for PSimNet communications of simulation data between the SSTF host and PTSs.

Ethernet, as defined in RFC-894, Standard for the Transmission of IP Datagrams Over Ethernet Networks, is used for connecting the PTSs with the SSTF CSIOP interface computer. The nondeterministic nature of Ethernet is not expected to be a problem considering the small number of attached computers and the relatively low message volume. It uses a 4-byte Cyclic Redundancy Check (CRC) value to validate each frame of message traffic. This feature provides a very high level of confidence that a message was received without error because it detects all errors involving an odd number of bits, all bursts of errors less than 32 bits long, and most other errors involving a combination of bits. Erroneous messages are silently dropped.

The User Datagram Protocol (UDP) used as the underlying transport protocol provides a fast transfer of datagrams, but delivery is not reliable. The user is expected to implement checks and controls for flow control, lost datagrams, duplicate datagrams, out-of-sequence datagrams, etc.

The IPS protocol stack is shown in Figure 30.3.3.6.1-1. The user-level protocol as described in the following section is also shown for completeness.

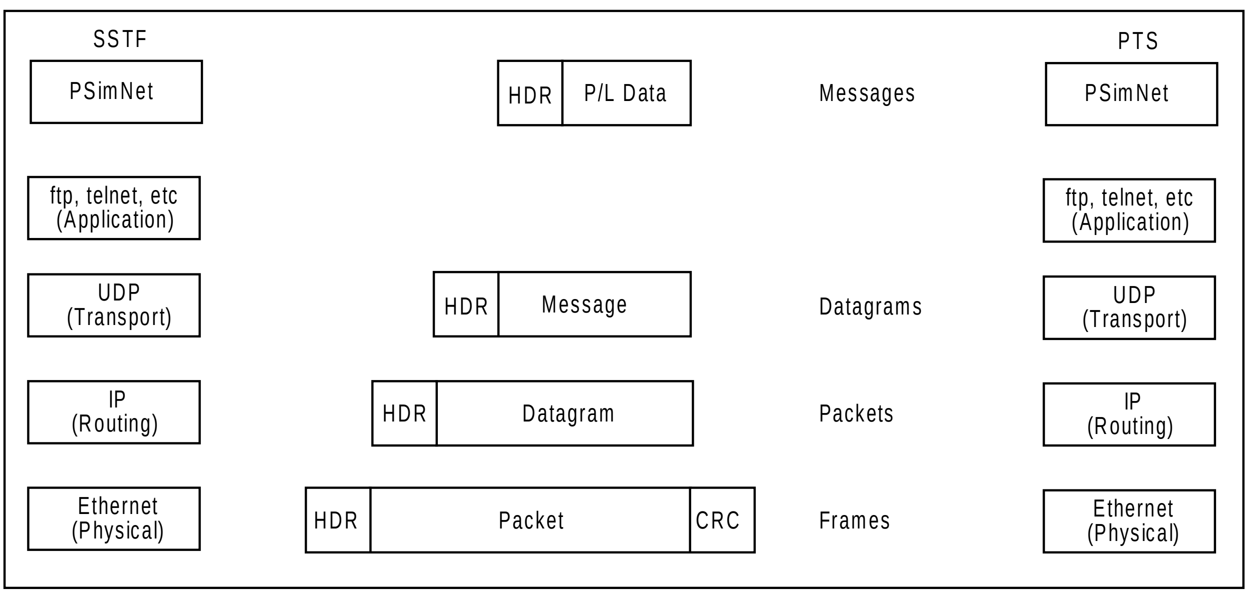

Figure 30.3.3.6.1-1 Internet Protocol Suite Stack

30.3.3.6.2 User-Level Protocol

PSimNet is the user-level protocol that has been developed to meet the communication needs of the PTSs. It defines the communication protocol to support the following:

a. Bring a PTS into the specified SSTF training session

b. Extend SSTF simulator control and training features to each PTS

c. Extend instructor controls to each PTS

d. Exchange payload and Space Station systems data

e. Implement checks and controls for lost and duplicated datagrams

30.3.3.6.2.1 Interface to UDP

UDP was chosen because of its efficiency and the ease of enhancing it to meet real-time communication requirements. Specifically, real-time messages fall into two categories: those that are delivery-critical and those that are time-critical. Delivery-critical messages must be received or the integrity of the simulation is jeopardized. Delivery is ensured by requiring the receiver to return an acknowledgment message. An example is an instructor command to go to Run. Time-critical messages are those for which the data in the message loses its value very quickly. Time-critical messages are generally cyclic. If a message is lost, another message will soon follow with updated data. An example is a cyclic transfer of a simulation value from the SSTF host system to a PTS.

30.3.3.6.2.2 Enhancement to UDP

Timers are used in conjunction with acknowledgments to detect lost messages. Each message requiring an acknowledgment will have a 1-second timer associated with it. Expiration of the timer is known as a timeout and is an indication that either communication has been disrupted or the message or its acknowledgment was lost. If the message was received but the acknowledgment was lost, resending the message would result in a duplicate message.

Sequence numbers are to be used to allow synchronization of acknowledgement messages and detection of duplicate messages. A message that is re-sent shall use the same sequence number as the original message. Any message with a duplicate sequence number shall be ignored. Independent number sequences shall be used for messages from the CSIOP to each of the PTSs and for messages from each PTS to the CSIOP.

The PTSs are slaved to the CSIOP. They shall accept and react to each message received. The CSIOP is responsible for maintaining communication with each PTS and will attempt to reestablish communications if it detects that communication is lost. There are occasions when the CSIOP will temporarily suspend all communications with the PTSs. Therefore, the PTSs cannot implement timeout logic but must rely on the CSIOP to keep communications alive.

30.3.3.6.2.3 Interprocess Communication Facilities

Interprocess Communication (IPC) is based on the 4.3 Berkeley Software Distribution (BSD) socket paradigm.

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30.4 INTERFACE SPECIFICATIONS

30.4.1 Overview

This section defines the logical and physical interfaces that apply to a PTS that is to be integrated into the SSTF and provides guidelines and rules for interfacing a PTS to the SSTF.

30.4.2 Logical Interfaces

All integrated PTSs shall comply with the PSimNet logical interfaces described in this section. The 1553B bus and PEHG data interfaces are equivalent to the real world and are not covered here. The PSE includes implementation of the PSimNet, 1553B, and PEHG interfaces and a database interface that provides easy definition by the PD of data transfer to and from the payload model.

30.4.2.1 Addresses

An integrated PTS will be assigned an IP address as required for use in the SSTF. The procedure for changing the IP address for a PSE is defined in SST-646.

The IP address for the CSIOP will be provided in the Connect message. This dynamic assignment supports the capability for the PTSs to be interchanged among the SSTF crew station elements.

Each of the PTSs shall use input port number 8000. The output port number will be provided in the Connect message.

Each integrated PTS computer shall provide for operator entry of a value for the 1553B RT address to be used for data transfer with the MDM software. The PSE includes an initialization file that can be edited to change the RT address value when the PTS is not connected to an active training session.

30.4.2.2 Data Formats

Data exchanged between integrated PTSs and the CSIOP or STFx via the PSimNet must conform to the floating-point format and the byte-addressing scheme described in the following sections. PSE software performs all required format conversions to and from PSE internal data formats.

30.4.2.2.1 Floating-Point Format

Floating-point data that is exchanged with the SSTF via the PSimNet shall conform to the IEEE-754 floating-point standard. Floating-point data may be defined as single precision (32 bits) or double precision (64 bits), depending on the precision required.

30.4.2.2.2 Byte Addressing

Data exchanged between the SSTF and integrated PTSs via the PSimNet shall comply with the big endian, or network order, byte-addressing scheme where bytes are addressed in ascending order. Depending on the byte-addressing scheme used by the PTS computer and the type of data being transferred, byte swapping may be required. PSE software performs all required byte swapping.

30.4.2.2.3 Simulation Terms Units

PTS terms that interface with SSTF simulation models shall be in the simulation term units required by the SSTF. Coordination with SSTF personnel may be required to determine the appropriate variant of these units, such as feet per second or miles per hour.

PTS terms to be displayed and/or entered at an IOS shall be in the units specified by the TST, which are normally the same units in which the corresponding payload term is expressed. Data parameters in 1553B messages will be in the units of the ISS parameters.

30.4.2.3 Message Formats

This section defines the PSimNet message formats. The PSE includes implementation of these message formats. The PEHG interfaces and the 1553B bus are standard Space Station components and are not described here. Other payload interfaces are unique to each PTS and are the responsibility of the PD.

Messages transmitted through the PSimNet shall adhere to the formats defined in this section exactly. References to actions taken by a CSIOP also apply to an STFx. Definitions of variable types used in the format definitions are as follows:

Variable Type	Description
boolean	8-bit field where 0 = False, 1 = True
char	8-bit ASCII character
float	32-bit IEEE-754 floating-point number
in_addr	Structure comprised of unsigned_32 IP address
int_8	8-bit signed integer
int_16	16-bit signed integer
int_32	32-bit signed integer
null_value	Field set to all zeros
string	Array of 8-bit ASCII characters. String variables included in PSimNet message definitions have a fixed length of 40 characters.

Variable Type	Description
time	Structure comprised of int_32 Year int_32 Day of Year int_32 Milliseconds past Midnight
unsigned_8	8-bit unsigned integer (range is 0 to 2**8-1)
unsigned_16	16-bit unsigned integer (range is 0 to 2**16-1)
unsigned_32	32-bit unsigned integer (range is 0 to 2**32-1).
group_di	16-bit field with each bit representing the state (0 = off, 1 = on) of a digital input variable.

30.4.2.3.1 Header Format

Every message shall begin with a header with a format as follows:

0	8	16	24
Src_ID		Dest_ID	
Msg_Type	Ver	Len	
Seq_Num		Cntrl_Fld	

where

Src_ID (int_16) is a unique simulation identifier for the originator of the message:
- 1 = CSIOP
- n = Payload Identifier (assigned at SSTF) where 10 < n < 32767

Dest_ID (int_16) is a unique simulation identifier for the receiver of the message:
- 1 = CSIOP
- 2 = Broadcast ID for Connect message only
- n = Payload Identifier assigned at SSTF, where 10 < n < 32767, for other messages

Msg_Type (unsigned_8) defines the contents of this message:
- 1 = Connect message
- 2 = Simulation Control message
- 3 = Station Data message
- 4 = Malfunction Control message
- 5 = Poke message
- 6 = Data Reset Acknowledgement message
- 9 = Error Acknowledgment message

11 = PTS Ready message
12 = Simulation Control Acknowledgment message
13 = PTS Data message
14 = Malfunction Acknowledgment message
15 = Poke Acknowledgment message
16 = Data Reset message
19 = Error message
100 = Ping message
101 = Ping Acknowledgment message
121 = Simulation Control Initialization/Return to Safestore Complete message
122 = Simulation Control Datastore Complete message

Ver (int_8) specifies the version level of this message format. This allows the protocol to interoperate at different revision levels so message format changes made for one PTS do not necessarily force every PTS to immediately adopt the new format.

Len (int_16) specifies the length in bytes (octets) of the entire message, including the header.

Seq_Num (unsigned_16) is the message sequence number, starting at an arbitrary value and incremented by one for each new message sent, which requires an acknowledgement (Msg_Type 2, 4, 5, 16, 19, 100). The starting value is specified in the Connect message for the CSIOP to PTS message and in the PTS Ready messages for the PTS to CSIOP message. This number is modulo 2**16.

Cntrl_Fld (unsigned_16) provides control information. For message types with multiple formats (Msg_Type 3, 4, 5, 13, 16), the Cntrl_Fld is the format number. For Acknowledgement message types (Msg_Type 6, 9, 12, 14, 15, 101, 121, 122), the Cntrl_Fld is the message sequence number that is being acknowledged. For the Connect message (Msg_Type 1) and PTS Ready message (Msg_Type 11), the Cntrl_Fld is the starting sequence number for the CSIOP and PTS, respectively. It will be zero for other messages, since it is not applicable).

30.4.2.3.2 Establish Connection Messages

Connection between the CSIOP payload agent and each PTS in the training session is established as follows:

a. Each PTS opens an input port and blocks on a read. At this point, the PTS is in the Ready state.

b. The CSIOP payload agent opens an output port and broadcasts the Connect message to all nodes on the PSimNet.

c. Each PTS in the Ready state receives the Connect message and shall open an output socket, enter Hold mode, and reply with a PTS Ready message. If a connection already exists for the PTS to the training session specified in the Connect message, the PTS shall consider the Connect message to be a restart command and shall terminate the current simulation, enter Hold mode, and reply with the PTS Ready message. PTSs already assigned to a different training session shall ignore this Connect message and the Ready message shall not be sent.

d. The CSIOP payload agent builds a list of active PTSs that are to be included in this training session.

e. Any PTSs that responded with a Ready message but are not on the list of active PTSs are sent a Simulation Control message with mode set to Terminate, which returns them to the Ready state.

At this point, the CSIOP payload agent has a list of online PTSs. The CSIOP payload agent will inform the SSTF payload agent of missing PTSs, and will indicate that its configuration phase is complete.

For an SPTC session, a single PSE and an STFx would take actions as defined in items a, b, and c above to establish the session.

30.4.2.3.2.1 Connect Message (1)

The Connect message is broadcast over the PSimNet to initiate establishment of a connection to each of the PTSs that are to be assigned to the current training session. This message consists of the header as defined in Section 30.4.2.3.1 and the CONNECT_MSG_PART. The CONNECT_MSG_PART includes the IP address of the originating CSIOP.

The content and format of the CONNECT_MSG_PART is as follows:

0	8	16	24
CSIOP_Addr			
spare			
Output_Port_Num		Session_Id_Len	spare
GMT			
Session_Id			

where

CSIOP_Addr (in_addr) is the IP address of the CSIOP payload agent.

spare (int_32) is not used (null_value).

Output_Port_Num (int_16) is the port number to use for sending messages to CSIOP.

Session_Id_Len (int_8) is the number of ASCII characters in Session_Id.

spare (int_8) is not used (null_value).

GMT (time) is the Greenwich Mean Time to set the PTS to.

Session_Id (string) is the alphanumeric name of this training session.

30.4.2.3.2.2 PTS Ready Message (11)

The PTS Ready message is issued in response to a Connect message from a CSIOP to indicate that the PTS is ready to participate in a training session with the CSIOP.

The Reply message consists of the header as shown in Section 30.4.2.3.1 and the PTS_RDY_PART. The format of the PTS_RDY_PART is as follows:

0	8	16	24
PTS_Addr			
Next_IC_Num		spare	

where

PTS_Addr (in_addr) is the IP address of this PTS.

Next_IC_Num (int_16) is the next available IC number.

spare (int_16) is not currently used (null_value).

30.4.2.3.3 Simulation Control Messages

Simulation Control messages are messages that affect the PTS simulation environment. Examples include changing the PTS simulation mode or creating a Datastore point to allow resetting of the simulation exercise at a later time. These messages are delivery-critical. If they are not successfully delivered, the integrity of the simulation will be compromised.

30.4.2.3.3.1 Simulation Control Message (2)

The Simulation Control message consists of the header and the SIM_CTL_MSG_PART and will be sent to PTSs aperiodically as required. The PTSs shall reply with a Simulator Control Acknowledgment message so that receipt of the message by each PTS can be verified. Some of these mode transitions require an indefinite amount of time to complete, resulting in the PTSs being in a suspended state of execution. In these cases, an additional acknowledgment is required to inform the CSIOP when each PTS has completed the transition.

Duplicate Simulation Control messages are possible. Duplicate messages shall be acknowledged using the same acknowledgment data as in the original acknowledgment message.

Information about how the PTS shall respond to messages specifying each of the modes is given in Section 30.3.3.5.2.

The content and format of the SIM_CTL_MSG_PART is as follows:

0	8	16	24
Mode	Safe_Store_Num	IC_Num	
SGMT			

where

Mode (int_8) is the new mode the PTS is to go to immediately:
- 1 = Initialization (initialize to the new IC point)
- 2 = Datastore (record a Datastore point)
- 3 = Freeze
- 4 = Run
- 5 = Safestore (record a Safestore point)
- 6 = Return to Safestore point (initialize to the specified IC point, then update with Safestore data for the specified Safestore number)
- 8 = Hold (suspend real-time execution)
- 9 = Terminate

Safe_Store_Num (int_8) is the Safestore number (only relevant to Safestore and Return to Safestore).

IC_Num (int_16) is the IC number (not relevant to Freeze, Run, Hold, and Terminate).

SGMT (time) is the new SGMT time to use.

30.4.2.3.3.2 Simulation Control Acknowledgment Message (12)

Each integrated PTS shall acknowledge receipt of Simulation Control messages even if the feature contained in the message is not implemented. The acknowledgment simply means that the message was received and understood, not that it was successfully completed.

The header suffices as the Simulation Control Acknowledgment message.

30.4.2.3.3.3 Simulation Control Initialization Complete Message (121)

Each integrated PTS shall send the Initialization Complete message when commanded to initialize and the initialization has completed. After initialization has completed, the PTS shall go to Hold mode.

The header suffices as the Simulation Control Initialization Complete Acknowledgment message.

30.4.2.3.3.4 Simulation Control Datastore Complete Message (122)

Each integrated PTS shall send the Datastore Complete message when commanded to create a Datastore point and Datastore has completed. After Datastore has completed, the PTS shall go to Hold mode. The Simulation Control Datastore Complete message consists of the header and the SIM_CTL_DS_PART.

The content and format of the SIM_CTL_DS_PART is as follows:

0 8	16 24
Next_IC_Num	spare

where

Next_IC_Num (int_16) is the next available IC number.

spare (int_16) is not currently used (null_value).

30.4.2.3.3.5 Simulation Control Return to Safestore Complete Message (121)

Each integrated PTS shall send the Initialization Complete message when commanded to return to a Safestore point and the initialization has completed. After the Return to Safestore initialization has completed, the PTS shall go to Hold mode. This Simulation Control Initialization Complete message shall be sent even if this feature is not implemented.

The header suffices as the Simulation Control Initialization Complete Acknowledgment message.

30.4.2.3.4 Station Data Message (3)

ISS systems simulation data will be sent to each PTS integrated into a training session periodically at a 1-hertz rate. These messages are considered time-critical. The Station Data message is defined in Table 30.6-I. The message format as defined in this revision of the PUDG is subject to being expanded in the future if changes are authorized to require the SSTF to provide additional parameters required by specific PTSs. In that case, the data as currently defined will be sent, followed by the new parameters. Each integrated PTS shall be capable of receiving a Station Data message containing up to 1400 bytes. Any data beyond that defined at the time the PTS software was implemented shall be ignored. It is also possible that additional formats for Station Data messages may be defined. If a PTS receives a Station Data message with a format number not defined at the time the software was implemented, it shall ignore the message.

30.4.2.3.5 PTS Data Messages (13)

Each integrated PTS shall periodically send, at a 1-hertz rate, PTS Data messages containing PTS systems data to the SSTF system host through the CSIOP. These messages are considered time-critical. PTS Data message layouts are defined in Tables 30.6-II through 30.6-VI. Note that the last two Boolean terms as defined in Table 30.6-VI are reserved for use as follows:

a. Lookable Boolean - 49 – Reserved - Fire Indicator: 0 = no fire in rack; 1 = fire in rack

b. Lookable Boolean - 50 – Reserved - Video Output Indicator: 0 = video output not active; 1 = video output active

30.4.2.3.6 Malfunction Control Messages (4)

Malfunctions are simulated faults that can be inserted and removed by an instructor using the Malfunction Control page at an IOS. Malfunction messages will be sent aperiodically whenever a new PTS malfunction is activated or an existing PTS malfunction is removed. These messages are delivery-critical. If they are not successfully delivered, the integrity of the simulation will be compromised.

Malfunction message layouts are defined in Tables 30.6-IX, 30.6-X, and 30.6-XI. The three types of malfunctions and the number supported for each type are as follows:

a. Simple (300) – Set a PTS boolean variable to true (1).

b. P1 (200) – Set a PTS variable to a value passed in the malfunction message.

c. P2 (50) – Set two PTS variables to values passed in the malfunction message. These are typically the scale and bias applied to calculation of a variable.

For each malfunction, the Status field shall be set to one if the malfunction is to be active and to zero if the malfunction is to be inactive. When one or more values for a malfunction type changes, the corresponding malfunction message shall be sent to the PTS.

30.4.2.3.7 Malfunction Acknowledgment Message (14)

The Malfunction Acknowledgment message shall contain only the header.

30.4.2.3.8 Enterable Data Messages

The capability to transfer values to a PTS is provided. A set of terms for each crew station rack location will be registered in the DIS as being Enterable from an IOS. The Poke message containing all of the values as shown in Table 30.6-VII will be sent to the designated PTS only when one or more of the terms is changed from an IOS. A Data Reset message as shown in Table 30.6-VIII will be sent by the PSE each time an initialization or Return to Safestore is completed to initialize all of the values for the Enterable Data DIS terms. Integrity of the Poke and Data Reset function is achieved by requiring an Acknowledgment message from the receiver. Note that the parameter Enterable Integer_8 - 40 has a special use by the PSE as defined in Section 30.3.3.5.2.3.

30.4.2.3.8.1 Poke Message (5)

The Poke message layout is defined in Table 30.6-VII.

30.4.2.3.8.2 Poke Acknowledgment Message (15)

The Poke Acknowledgment message shall contain only the header.

30.4.2.3.8.3 Data Reset Message (16)

The Data Reset message layout is defined in Table 30.6-VIII.

30.4.2.3.8.4 Data Reset Acknowledgment Message (6)

The Data Reset Acknowledgment message shall contain only the header.

30.4.2.3.9 Error Messages

The Error message provides the vehicle for an integrated PTS to report errors to the CSIOP payload agent and/or the instructor. These delivery-critical messages can be sent aperiodically as the need arises. Only one error can be reported per message, but multiple messages can be sent back-to-back. When an error message is received at the CSIOP, it will be reported to Status and Control (SaC) for further action, based on the severity of the error. The integrated PTS should be designed to detect occurrences of error events and report them via error messages. The PTS should also be designed to detect the continuation of an error condition and avoid repeated error messages for the same condition.

30.4.2.3.9.1 Error Message (19)

The Error message consists of the header and the ERR_MSG_PART. Table 30.4.2.3.9.1-I defines the set of standard error messages that every integrated PTS shall incorporate as applicable.

Table 30.4.2.3.9.1-I Standard Error Messages

Error No.	Severity Level	Category	Description
100	2	1	Requested IC point does not exist

Error No.	Severity Level	Category	Description
101	2	1	Unrecoverable software error
102	2	2	1553B not responding properly
103	2	2	PEHG not responding properly
104	2	2	Other hardware interface not responding properly
105	1	1	Invalid PSimNet message (header unintelligible)
106	1	1	Invalid PSimNet message (length is wrong)
107	1	1	Invalid PSimNet message (unable to perform requested action)
108	1	1	Invalid PSimNet message (miscellaneous)
109	1	1	(Description filled in by PTS on a case-by-case basis)
110	1	2	(Description filled in by PTS on a case-by-case basis)
111	1	3	(Description filled in by PTS on a case-by-case basis)
112	1	4	(Description filled in by PTS on a case-by-case basis)
113	2	1	(Description filled in by PTS on a case-by-case basis)
114	2	2	(Description filled in by PTS on a case-by-case basis)
115	2	3	(Description filled in by PTS on a case-by-case basis)
116	2	4	(Description filled in by PTS on a case-by-case basis)
117	3	1	(Description filled in by PTS on a case-by-case basis)
118	3	2	(Description filled in by PTS on a case-by-case basis)
119	3	3	(Description filled in by PTS on a case-by-case basis)
120	3	4	(Description filled in by PTS on a case-by-case basis)

The format of the ERR_MSG_PART is as follows:

0 8	16	24
Err_Num	Severity_Level	Category
Description (256 characters, blank filled)		

where

Err_Num (int_16) is the error number in the range 100 to 120. (These errors will be reported in the range of 20100 to 20120 at the IOS. The CSIOP will incorporate the payload ID and possibly other data in the process of converting them to the proper values.)

Severity_Level (int_8) shows the level of severity. Use the following:

1 = Info_Only – Reported to SaC as just information.

2 = Warning – Reported to SaC as an abnormal condition where the training exercise will likely be in a degraded configuration.

3 = Error – Reported to SaC as a catastrophic error; the training exercise is in jeopardy. PTS errors are not generally considered catastrophic.

Category (int_8) identifies the component causing the error.

1 = Software error

2 = Hardware error

3 = Configuration error

4 = Debug message (to be removed before delivery)

Description (string) contains 256 characters that describe the error condition and possibly a recovery action. The field must be padded with blanks. This information is displayed at the IOS and should be as descriptive and informative as possible.

30.4.2.3.9.2 Error Acknowledgment Messages (9)

The CSIOP will acknowledge each Error message received using the header.

30.4.2.3.10 Ping Messages

After communication is established, messages are expected to be exchanged cyclically at least once per second. However, there may be situations when normal communication is suspended for a short and indefinite period of time, such as when creating a Datastore point. In this case, and possibly other cases, a message may be needed to determine whether a PTS is still connected. These messages must be acknowledged. No response will indicate that the PTS is hung up and must be manually restarted.

30.4.2.3.10.1 Ping Message (100)

The Ping message consists of the header and the PING_MSG_PART. This message shall be sent only when needed. The format of the PING_MSG_PART is as follows:

0	8	16	24
GMT			
SGMT			

where

GMT (time) is the GMT.

SGMT (time) is the simulated GMT.

30.4.2.3.10.2 Ping Acknowledgment Message (101)

The header with the Msg_Type field set to 101 shall be returned for each Ping message received.

The Ping Acknowledgment message consists of the header and the PING_ACK_MSG_PART. The format of the PING_ACK_MSG_PART is as follows:

0	8	16	24
PTS_Addr			
spare			
Mode	Session_Id_Len	IC_Num	
SGMT			
GMT			
Session_Id			

where

PTS_Addr (in_addr) is the IP address of this PTS.

spare (int_32) is not used (null_value).

Mode (int_8) is the mode the PTS is currently in.

Session_Id_Len (int_8) is the number of ASCII characters in Session_Id name.

IC_Num (int_16) is the current Initial Conditions number.

SGMT (time) is the simulated GMT.

GMT (time) is the GMT.

Session_Id (string) is the alphanumeric name of this training session.

30.4.3 Mechanical Interfaces

30.4.3.1 Mass Properties

The International Standard Payload Rack (ISPR) locations in the crew station elements have been constructed to support a maximum weight load of 1750 pounds. This load includes all rack equipment, including seat track-mounted equipment, and the weight of 101 pounds of the Rack Mobility Unit (RMU) as described in Appendix IV, Section 40.3.3.3.1.

The center of mass of each PTS-populated ISPR shall be located so that the PTS does not present a safety hazard from tipping while it is being unpacked or packed at the SSTF, in storage at the SSTF, being moved using an RMU or castered pallet, being used in an SPTC session, or being used for training in a crew station element ISPR location. Refer to Appendix IV, Section 40.3.3.3.1, for information about the RMU and to Appendix IV, Section 40.3.3.3.2, for information about the castered pallet. Information about use of a PTS in a crew station element ISPR location is provided in Section 30.4.3.2.1. If the PTS requires any equipment extending beyond the width or maximum depth of the SSTF ISPR to make it stable during storage or use in an SPTC session or SSTF crew station element ISPR location, the PD and TST for the PTS are responsible for obtaining a waiver as described in Section 1.4

30.4.3.2 Physical Interfaces

This section defines the SSTF physical interfaces with which a PTS shall comply in order to be integrated into the SSTF. Each SSTF crew station element ISPR location will provide structural and mechanical support and electrical and data interfaces for a PTS contained in an SSTF ISPR or a PD-provided rack with equivalent dimensions, connection points, and electrical and data interfaces. More information about the SSTF ISPR is given in Appendix IV, Section 40.3.3.

30.4.3.2.1 Crew Station Element ISPR Structural Interfaces

Each SSTF crew station element ISPR location will have dimensions and attachment points that will accept a rack with the dimensions and mounting provisions of an ISS flight ISPR as defined in SSP-30257:008, U.S. Standard Equipment Rack Standard Interface Control Document; SSP-41017, Rack to Mini-Pressurized Logistics Module Interface Control Document, Parts 1 and 2; and SSP-52000-PAH-PRP, International Space Station Payload Accommodations Handbook, Pressurized Payloads. Because of limitations of the SSTF training environment, the SSTF ISPR does not support rack tilting. Figure 30.4.3.2.1-1 shows nominal dimensions of a crew station element ISPR location. Note that the height at the rear is greater than the height at the front.

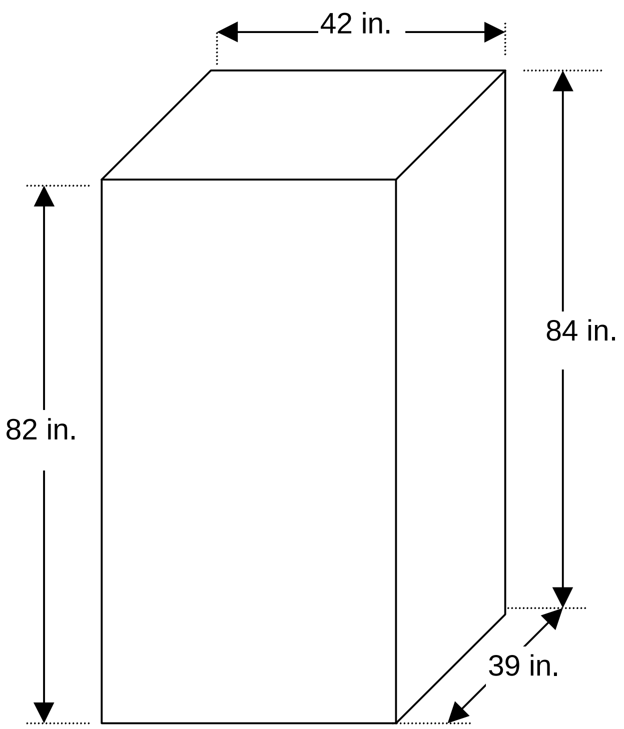

Figure 30.4.3.2.1-1 Crew Station Element ISPR Location Dimensions

Any computer or other support equipment required for the PTS must be located within the rack volume except that it may protrude from the back of the rack provided that it does not extend further than the normal back of the SSTF ISPR shell. If the PTS requires removal of the side or rear access panels, the PD shall provide a method of rack ventilation that prevents heat transfer to adjacent rack locations. If PTS equipment does not fully enclose the front of the rack, the PD shall provide closeouts to complete the enclosure so that the crew station facility environment will be maintained.

Structural supports for the ceiling of the crew station elements are located between the rack positions. This requires a 3-inch spacing between racks that is not present in the ISS U.S. Laboratory flight element. Also, structural supports result in obstructions between rack positions. If interconnections are required between PTSs, they shall be provided by the PD and shall be long enough to reach between racks, considering the extra spacing and obstructions.

The general design for a crew station element ISPR location provides for a PTS with an attached RMU resting on the floor of the crew station element with no constraints except for turnbuckle assemblies that are redundant safety equipment only and are not designed to be under load during normal crew training operations. If the PTS is not stable when free standing in all configurations, including extension of equipment and equipment mounted to seat tracks, the PD is responsible for negotiating agreements with the TST and SSTF for securing the PTS to the crew station element structure. These arrangements may restrict the PTS to only ISPR locations with special outfitting.

If a PTS contains Flight Equivalent Unit (FEU) or other components that require any additional utilities, the utilities shall be provided by the PD.

30.4.3.2.2 Standoff-Mounted Interface Panel

Electrical and data interfaces to PTSs at SSTF crew station element ISPR locations are provided by a Standoff-Mounted Interface Panel (SIP) that provides a mixture of simulated and functional connectors corresponding to connectors in the ISS Laboratory Module as well as functional power and data interfaces for use by a PTS. Each integrated PTS is required to include an ISPR-Mounted Interface Panel (IIP) as described in Appendix IV, Section 40.3.4. SSTF provided interconnecting umbilicals are used to connect the IIP to the SIP to complete the PTS to SSTF interfaces.

SIPs will be located as a subfloor assembly beneath crew station element ISPR locations. SIP connectors will be accessible through a hole in the floorplate located just behind the front of the rack. For an SSTF ISPR mounted on an RMU as described in Section 40.3.3.3.1, the SIP will be mounted 5.5 inches below the rack bottom surface. Layout of the SIP and orientation of the SIP, IIP, and FDS/MAINT panel are shown in Figure 30.4.3.2.2-1.

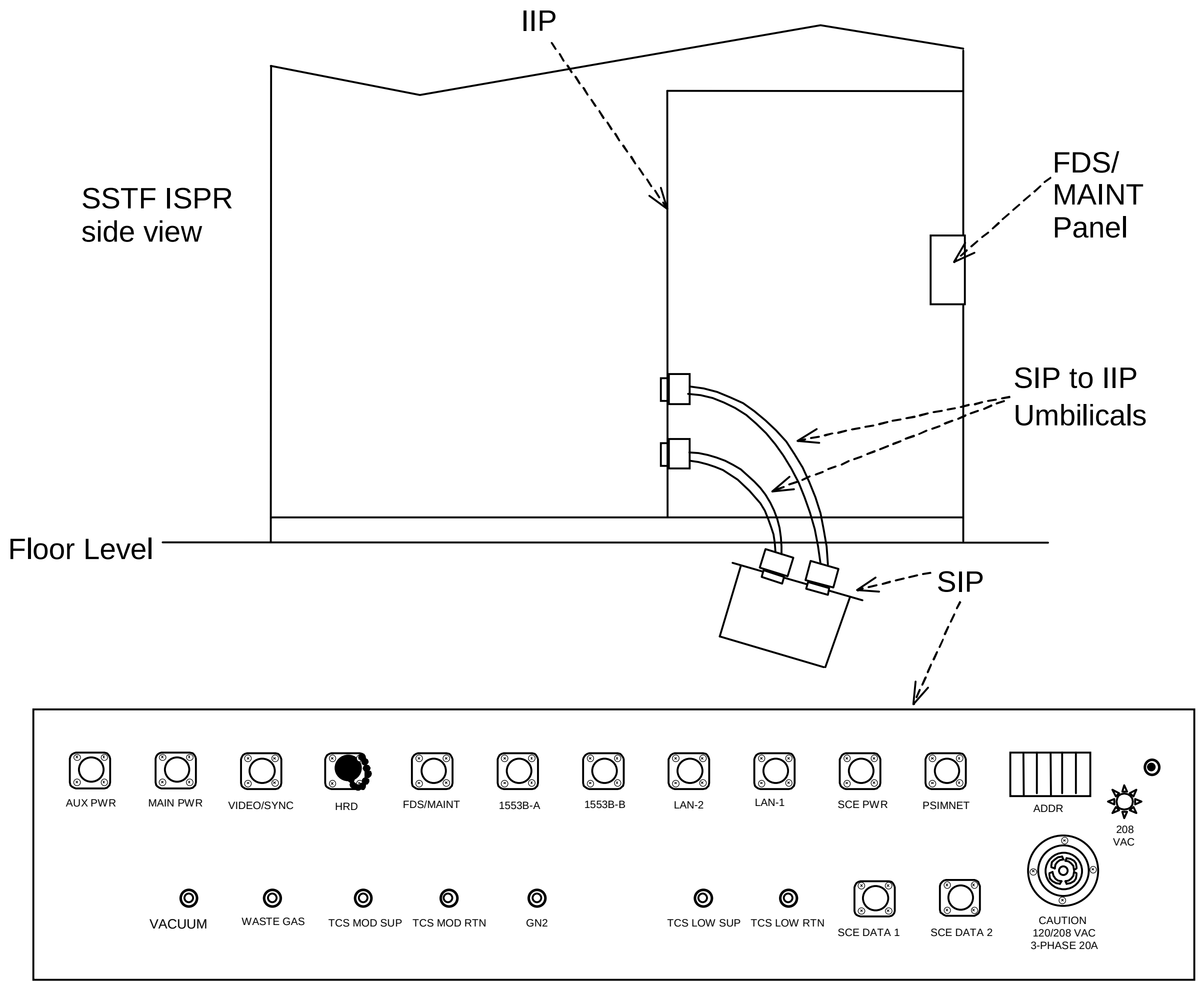

Figure 30.4.3.2.2-1 SIP Layout and Interface Panels Configuration

Table 30.4.3.2.2-I provides a list of all SIP connectors and a cross-reference to the ISS Utility Interface Panel (UIP) connectors if applicable. Column one shows the connector labels on the front of the SIP. Column two indicates the type of connector. Column three indicates the ISS connector reference designators, based on data contained in SSP-41002, International Standard Payload Rack to NASA/ESA/NASDA Modules Interface Control Document. Electrical power and data connectors are indicated as *J* with a number. Other connectors are for gases and fluids as shown. Connectors with *N/A* in this column are simulation-unique and do not have an ISS UIP equivalent. Column four provides additional information about the SIP interfaces.

Table 30.4.3.2.2-I SIP Connector Summary

SIP Connector Label	Connector Type	ISS UIP Connector Reference Designator	Comments
AUX PWR	Connect Status	J2 ESSENTIAL/ AUXILARY POWER	Simulation only, 120 VDC not available at the SIP.
MAIN PWR	Connect Status	J1 MAIN POWER	
VIDEO/SYNC	Video Data	J16 VIDEO/SYNC	Video out from PTS.
HRD	Not supported	J7 HRD	Connector not active.
FDS/MAINT	SSTF SCE Data	J43 FDS/MAINT	Drives FDS light from SSTF, reads Maintenance Switch status into SSTF.
1553B-A	1553B Data	J3 1553B-A	Functional data transfer with OBCS C&DH.
1553B-B	1553B Data	J4 1553B-B	
LAN-2	Ethernet	J47 LAN-2	Functional data transfer through PEHG.
LAN-1	Ethernet	J46 LAN-2	
VACUUM	Connect Status	VACUUM	Simulation of connection status of fluid and gas quick-connect fixtures. Operational fluids and gases not available.
WASTE GAS	Connect Status	WASTE GAS	
TCS MOD SUP	Connect Status	TCS MOD SUPPLY	
TCS MOD RTN	Connect Status	TCS MOD RETURN	
GN2	Connect Status	GN2	
TCS LOW SUP	Connect Status	TCS LOW SUPPLY	
TCS LOW RTN	Connect Status	TCS LOW RETURN	
SCE PWR	Unused	N/A	PTS use of SSTF SCE no longer supported, so connectors are unused.
SCE DATA 1	Unused	N/A	
SCE DATA 2	Unused	N/A	
PSIMNET	Ethernet	N/A	Simulation unique.
120/208 VAC	Functional Power	N/A	120/208 VAC three-phase at 20 amperes and facility multipoint safety-ground system for use by PTS.
Unlabeled	Functional Ground	N/A	

The SIP and IIP provides a status-only simulation of 120 VDC power, vacuum, and fluid interfaces. A connect-status signal is derived when an umbilical is properly installed between the SIP and the IIP. The IIP connector pins are jumpered to complete the connect-status circuit. The simulated 120 VDC connectors on the IIP are keyed to prevent cross connection. The simulated vacuum and fluid connectors are not keyed to physically prevent cross-installation. The connectors and umbilicals will be labeled and electrically keyed such that connect status will not be returned to the SSTF simulation software by an incorrectly connected umbilical.

The right portion of the SIP is reserved for simulation-unique interfaces. The SCE power and data connectors are no longer used, since PTS use of the SSTF SCE is no longer supported. The SIP also includes a six-position thunbwheel switch originally intended to be used to set the 1553B RT address to be used by the PTS. The RT address is specified by PSE configuration data, so the switches are no longer used.

30.4.4 Electrical Interfaces

30.4.4.1 Power

The SIP at each crew station element ISPR location includes connectors for AC electrical power and ground. One five-wire connector (NEMA L21-20) will supply 120/208 VAC three-phase power at 20 amperes. Although a 20-ampere circuit is provided, cooling and ventilation is only provided for 2 kilowatts of power dissipation for each ISPR location. A separate ground strap will allow the PTS to be connected to the SSTF multipoint safety-ground system. The SSTF will provide power and ground umbilicals to connect from the SIP to the IIP. Power connections on the IIP are described in Appendix IV, Section 40.3.4.2.

PTS wiring to the IIP terminal strip shall provide sufficient service loop to allow reconnection at the SSTF to any phase. Changing power phase wiring may be required during integration to maintain balanced currents between the phases within the facility. The PTS User's Guide shall document any specific power phase relationships required by the PTS.

30.4.4.2 Computer Interfaces

30.4.4.2.1 Ethernet Interfaces

30.4.4.2.1.1 Payload Ethernet Hub Gateway

The SIP provides interface connections to the two simulated payload Ethernet LANs at each crew station element rack location. Shielded twisted pair cable is used to connect each SIP to the emulated PEHGs and to connect the PEHG to payload Ethernet outlets at the UOPs. The PEHGs are connected through a 1553B bus to the emulated payload MDM for control and monitoring.

30.4.4.2.1.2 PSimNet

The SIP provides interface connections to the PSimNet LAN at each crew station element rack location. The SSTF PTC provides the LAN interface for PSimNet data transfers between the SIP and the CSIOP.

30.4.4.2.2 Payload 1553B Standard Interface

The SIP provides ISS-compatible standard payload 1553B Bus A and Bus B interfaces at each crew station element rack location for connection to the PEP. The interfaces use shielded twisted pairs to support a data rate of 1 Mbps. Each 1553B bus is dual-redundant with transformer coupling and conforms to MIL-STD-1553B.

30.4.4.3 Video Interfaces

Integrated PTS video signals shall conform to NTSC composite format RS-170. A multicoaxial connector supports Video Switching and Distribution (VSD) output signals from the PTS to the SSTF.

30.4.4.4 Fire Detection System/Maintenance Switch Interface

The Fire Detection System (FDS) lights and Rack Power Switches (RPSs) in the ISS are wired to MDMs for status, processing, and control. The FDS lights are driven by MDM FSW to indicate smoke detection. The RPS position is sensed by an MDM, and MDM FSW controls the associated Remote Power Controller Module (RPCM) to control 120 VDC to the ISPR.

The SSTF implementation of the FDS and RPS functions includes a combination of simulation-unique hardware and software with FSW running in emulated MDMs. SSTF simulation of the FDS is described in Section 4.5.3.4. SSTF simulation of the RPS is described in Section 4.5.4. The SIP at each SSTF crew station element ISPR location provides a connector for SSTF SCE data to communicate FDS and RPS status between the SSTF simulation software and an integrated PTS. The maintenance switch position in the PTS is sensed by an SSTF SCE digital input value. The FDS light at each crew station element rack position is controlled by simulation software via an SSTF SCE digital output value. FDS status is not included in the PSimNet data sent to the PTS computer.

An SSTF FDS/MAINT panel that can be used to meet the SSTF interface requirements is described in Appendix IV, Section 40.3.5. Note that the RPS was previously known as the Rack Maintenance Switch (RMS) and that name is still used in some SSTF documents and drawings. If the SSTF FDS/MAINT panel is not included in an integrated PTS, the PD shall provide for the FDS and RPS functions and interconnection to the IIP as specified in Section 40.3.5.

30.4.5 Thermal Interfaces

30.4.5.1 Environment

All PTSs and support equipment shall operate within the existing temperature and humidity limits for the SSTF. The SSTF operating environment is characterized by the following conditions:

a. 70° F

b. Relative humidity of 40 to 70 percent (noncondensing)

Air below the floor of the crew station elements will be at a nominal temperature of 65° F and 40 percent relative humidity (noncondensing) to allow it to be used for cooling PTS equipment. Filtering will be provided by the facility air conditioning system inlet filter. The SSTF will provide transport for up to 400 CFM of air from the crew station element into the Building 5 South air conditioning system for each ISPR location. This provision will support cooling of up to 2 kilowatts for each ISPR location.

If the PTS is installed in an SSTF ISPR, it can use provisions incorporated into the SSTF ISPR design for cooling the PTS as described in Appendix IV, Section 40.3.3.2. The PTS shall provide for complete enclosure of the front of the rack. If the PTS design requires removal of the rack side or rear access panels, the PD shall provide a method of preventing heat transfer to adjacent rack locations.

If a PTS is not installed in an SSTF ISPR or rack with similar provision for equipment cooling, it shall incorporate a self-contained ventilation system that transports the dissipated power outside of the crew station enclosure. Racks requiring air cooling may use the air below the crew station element floors to control conditions of temperature and humidity in their PTS.

30.5 PAYLOAD RESOURCE UTILIZATION FORMS

The Payload Resource Utilization forms are used to collect resource usage data about payloads to be incorporated into PRU models. The forms include the Pressurized Payload PRU Data form and the Attached Payload PRU Data form.

The Pressurized Payload PRU Data form is used to identify data that will drive a PRU model for a specific payload rack assigned to a Lab location. Utilization data shall be entered for payload modes of Off, Standby, and On. Each item on the Pressurized Payload PRU Data form (see Figure 30.5-1) is explained or clarified as follows.

Payload Name – Name or description relevant to the rack.

Lab Location – There are 13 valid rack locations for the Lab:

Ceiling:	LAC1, LAC2, LAC3, LAC4, LAC5
Floor:	LAF3 (window rack)
Port:	LAP1, LAP2, LAP4
Starboard:	LAS1, LAS2, LAS3, LAS4

Rack Type – Enter a number: 1, 2, 3, 4

1 = Single payload rack.
2 = Core rack of a multiple rack payload. This is the RT for a multiple rack payload.
3 = Non-core rack of a multiple rack payload.
4 = Multiple payload rack (e.g., EXPRESS rack).

Main Power Bus – Nominal Watts – Power used for nominal voltage.

Essential Power Bus – Nominal Watts – Power used for nominal voltage.

Moderate Temperature Loop – Heat Exchange Rate (Btu/sec) – Amount of heat added into the moderate temperature cooling loop

Low Temperature Loop – Heat Exchange Rate (Btu/sec) – Amount of heat added into the low temperature cooling loop

Atmospheric Heat Exchange Rate (Btu/sec) – Amount of heat added into the Lab atmosphere

Nitrogen – Nominal lb/sec – Amount of nitrogen normally used by the payload.

Waste gas – Nominal lb/sec – Nominal flow rate of waste gases expelled by the payload.

Vacuum Resource – Nominal lb/sec – Nominal flow rate of “vacuum” used by the experiment.

The Attached Payload PRU Data form is used to identify data that will drive an attached payload PRU model. Utilization data shall be entered for payload modes of Off, Standby, and On. Each item on the Attached Payload PRU Data form (see Figure 30.5-2) is explained or clarified as follows.

Payload Name – Name or description of the attached payload

Main Power Bus – Nominal Watts – Power used for nominal voltage

Essential Power Bus – Nominal Watts – Power used for nominal voltage

PRESSURIZED PAYLOAD PRU DATA

Payload Name ____

Lab Location: _______ Rack Type _____________________

EPS

	Payload Modes		
	OFF	STANDBY	ON
Main Power Bus - Nominal Watts	_______	_________	_______
Essential Power Bus - Nominal Watts	_______	_________	_______

TCS

Moderate Temperature Loop - Heat Exchange Rate (Btu/sec)	_______	_________	_______
Low Temperature Loop - Heat Exchange Rate (Btu/sec)	_______	_________	_______

ECLSS

Atmospheric Heat Exchange Rate (Btu/sec)	_______	_________	_______
Nitrogen - Nominal pounds per second	_______	_________	_______
Waste gas - Nominal pounds per second	_______	_________	_______
Vacuum Resource - Nominal pounds per second	_______	_________	_______

Figure 30.5-1 Pressurized Payload PRU Data Form

ATTACHED PAYLOAD PRU DATA

Payload Name ____

EPS

	Payload Modes		
	OFF	STANDBY	ON
Main Power Bus - Nominal Watts	_______	_________	_______
Essential Power Bus - Nominal Watts	_______	_________	_______

Figure 30.5-2 Attached Payload PRU Data Form

30.6 PSIMNET MESSAGE LAYOUTS

This section provides layouts for PSimNet messages used to transmit data between the SSTF and an integrated PTS. Each layout defines the contents of the message header, any fixed simulation variables contained in the message, and a definition of parameter fields that can be used as defined by the PD to transmit PTS-unique data between the SSTF and the PTS. A layout definition is provided for each message type and format, with a row for each parameter and the following columns:

a. Byte – The displacement of the beginning of the parameter from the beginning of the message

b. Contents – The specific contents of the parameter or an indication of the type of data contained in the parameter

c. Type – The data type for the parameter (see Section 30.4.2.3)

d. DIS Term Suffix – The suffix of the SSTF DIS term used to reference the parameter (see Section 30.3.3.4), where the complete DIS term name is

USAV.<partition_name>.<simulator_rack_designation>.<suffix>

where

<partition name> corresponds to the ISS module in which the rack is located, Lab_Sys_Mgr_Pld for the U.S. Lab

<simulator_rack_designation> is the ISS module location for the rack, chosen from LAS1, LAS2, LAS3, LAS4, LAC1, LAC2, LAC3, LAC4, LAC5, LAP1, LAP2, LAP4, LAF3 for the U.S. Lab.

For example, the DIS term for the Low Temperature Loop Coolant Flow Rate for the U.S. Lab Port 1 ISPR is

USAV.Lab_Sys_Mgr_Pld.LAP1.Coolant_Flow_Low

e. PTS Term Name – Blank, to allow the PD to specify a name for the corresponding parameter in the PTS database

f. Comments – Either descriptive information about the field or blank, to allow the PD to specify information about use of the parameter in the PTS

Message layouts for PSimNet messages that transfer data between the SSTF and a PTS are shown in the following tables:

a. Station Data Message Layout – Table 30.6-I

b. PTS Data Message Format 1 Layout – Table 30.6-II

c. PTS Data Message Format 2 Layout – Table 30.6-III

d. PTS Data Message Format 3 Layout – Table 30.6-IV

e. PTS Data Message Format 4 Layout – Table 30.6-V

f. PTS Data Message Format 5 Layout – Table 30.6-VI

g. Poke Message Layout – Table 30.6-VII

h. Data Reset Message Layout – Table 30.6-VIII

i. Malfunction Control Message Format 1 Layout – Table 30.6-IX

j. Malfunction Control Message Format 2 Layout – Table 30.6-X

k. Malfunction Control Message Format 3 Layout – Table 30.6-XI

Table 30.6-I Station Data Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Fixed value = 1 for CSIOP
3	Destination ID	int_16	none		Unique value for PTS defined by SSTF
5	Message Type	unsigned_8	none		Fixed value = 3 for Station Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 81
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 1 for this message
****	**Resource Data**	*44 bytes	******	******	******
13	Main Bus Voltage	float	Main_Bus_Voltage		Main voltage available - J1 (V)
17	Aux Bus Voltage	float	Aux_Bus_Voltage		Aux voltage available - J2 (V)
21	Coolant Flow Low	float	Coolant_Flow_Low		Flow rate - Low temp coolant loop (lb/sec)
25	Coolant Temp Low	float	Coolant_Temp_Low		Inlet temperature - Low temp loop (°F)
29	Coolant Flow Mod	float	Coolant_Flow_Mod		Flow rate - Moderate temp loop (lb/sec)
33	Coolant Temp Mod	float	Coolant_Temp_Mod		Inlet temp - Moderate temp loop (°F)
37	Cabin Temperature	float	Cabin_Temperature		Cabin temperature (°F)
41	Cabin Pressure	float	Cabin_Pressure		Cabin pressure (psi)
45	N2 Pressure Available	float	N2_Pressure_Available		Laboratory nitrogen system pressure (psi)
49	Vacuum Available	float	Vacuum_Available		Vacuum resource pressure available (psi)
53	Exhaust Vac Available	float	Exhaust_Vac_Available		Vacuum exhaust pressure available (psi)
****	*Simulation values	*25 bytes	******	******	******
57	SSTF GMT Year	int_32	SSTF_GMT_Year		Current value for GMT year used by SSTF
61	SSTF GMT Day	int_32	SSTF_GMT_Day		Current value for GMT day of year used by SSTF
65	SSTF GMT Milliseconds	int_32	SSTF_GMT_ Milliseconds		Current value for GMT milliseconds since midnight used by SSTF
69	SSTF SGMT Year	int_32	SSTF_SGMT_Year		Current value for SGMT year used by SSTF

Table 30.6-I Station Data Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
73	SSTF SGMT	int_32	SSTF_SGMT_Day		Current value for SGMT day of year used by SSTF
77	SSTF SGMT	int_32	SSTF_SGMT_ Milliseconds		Current value for SGMT milliseconds since midnight used by SSTF
81	SSTF Mode Number	int_8	SSTF_Mode_Number		SSTF session mode

Table 30.6-II   PTS Data Message Format 1 Layout – Fixed 1-Hertz Data

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 13 for PTS Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 85
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 1 for this message
***	*Resource Usage Data	**36 bytes	******	******	******
13	Main Power Used)	float	Main_Power_Used		Main power J1 usage (watts)
17	Aux Power Used	float	Aux_Power_Used		Aux power J2 usage (watts)
21	Heat Added Low	float	Heat_Added_Low		Low temp loop heat exchange rate (Btu/sec)
25	Heat Added Mod	float	Heat_Added_Mod		Moderate temp loop heat exchange rate (Btu/sec)
29	Valve Position Mod	float	Valve_Position_Mod		Valve position-moderate temp loop (0 = closed, 1 = completely open)
33	Heat added to Cabin	float	Heat_To_Cabin		Atmospheric heat exchange rate (Btu/sec)
37	N2 Used	float	N2_Used		N2 consumption rate (lb/sec)
41	Vacuum Used	float	Vacuum_Used		Vacuum resource usage rate (lb/sec)
45	Waste Gas flow	float	Waste_Gas_Flow		Exhaust gas flow rate (lb/sec)
***	*PTS parameters**	***37 bytes	******	******	******
49	PTS GMT Year	int_32	PTS_GMT_Year		Current value for GMT year used by PTS
53	PTS GMT Day	int_32	PTS_GMT_Day		Current value for GMT day of year used by PTS
57	PTS GMT Milliseconds	int_32	PTS_GMT_ Milliseconds		Current value for GMT milliseconds since midnight used by PTS
61	PTS SGMT Year	int_32	PTS_SGMT_Year		Current value for SGMT year used by PTS

Table 30.6-II PTS Data Message Format 1 Layout – Fixed 1-Hertz Data

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
65	PTS SGMT Day	int_32	PTS_SGMT_Day		Current value for SGMT day of year used by PTS
69	PTS SGMT Milliseconds	int_32	PTS_SGMT_ Milliseconds		Current value for SGMT milliseconds since midnight used by PTS
73	FSW Perceived GMT Year	int_32	FSW_Perceived_GMT_ Year		Time year received from MDM via 1553B
77	FSW Perceived GMT Day	int_32	FSW_Perceived_GMT_ Day		Time day of year received from MDM via 1553B
73	FSW Perceived GMT Milliseconds	int_32	FSW_Perceived_GMT_ Milliseconds		Time milliseconds since midnight received from MDM via 1553B
85	PTS Mode number	int_8	PTS_Mode_Number		Number representing current PTS mode

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 13 for PTS Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 1212
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 2 for this message
****	** Data parameters	*1200 bytes	******	******	******
13	Lookable Float - 1	float	Look_Float(1)		
17	Lookable Float - 2	float	Look_Float(2)		
21	Lookable Float - 3	float	Look_Float(3)		
25	Lookable Float - 4	float	Look_Float(4)		
29	Lookable Float - 5	float	Look_Float(5)		
33	Lookable Float - 6	float	Look_Float(6)		
37	Lookable Float - 7	float	Look_Float(7)		
41	Lookable Float - 8	float	Look_Float(8)		
45	Lookable Float - 9	float	Look_Float(9)		
49	Lookable Float - 10	float	Look_Float(10)		
53	Lookable Float - 11	float	Look_Float(11)		
57	Lookable Float - 12	float	Look_Float(12)		
61	Lookable Float - 13	float	Look_Float(13)		
65	Lookable Float - 14	float	Look_Float(14)		
69	Lookable Float - 15	float	Look_Float(15)		
73	Lookable Float - 16	float	Look_Float(16)		
77	Lookable Float - 17	float	Look_Float(17)		
81	Lookable Float - 18	float	Look_Float(18)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Lookable Float - 19	float	Look_Float(19)		
89	Lookable Float - 20	float	Look_Float(20)		
93	Lookable Float - 21	float	Look_Float(21)		
97	Lookable Float - 22	float	Look_Float(22)		
101	Lookable Float - 23	float	Look_Float(23)		
105	Lookable Float - 24	float	Look_Float(24)		
109	Lookable Float - 25	float	Look_Float(25)		
113	Lookable Float - 26	float	Look_Float(26)		
117	Lookable Float - 27	float	Look_Float(27)		
121	Lookable Float - 28	float	Look_Float(28)		
125	Lookable Float - 29	float	Look_Float(29)		
129	Lookable Float - 30	float	Look_Float(30)		
133	Lookable Float - 31	float	Look_Float(31)		
137	Lookable Float - 32	float	Look_Float(32)		
141	Lookable Float - 33	float	Look_Float(33)		
145	Lookable Float - 34	float	Look_Float(34)		
149	Lookable Float - 35	float	Look_Float(35)		
153	Lookable Float - 36	float	Look_Float(36)		
157	Lookable Float - 37	float	Look_Float(37)		
161	Lookable Float - 38	float	Look_Float(38)		
165	Lookable Float - 39	float	Look_Float(39)		
169	Lookable Float - 40	float	Look_Float(40)		
173	Lookable Float - 41	float	Look_Float(41)		
177	Lookable Float - 42	float	Look_Float(42)		
181	Lookable Float - 43	float	Look_Float(43)		
185	Lookable Float - 44	float	Look_Float(44)		
189	Lookable Float - 45	float	Look_Float(45)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Lookable Float - 46	float	Look_Float(46)		
197	Lookable Float - 47	float	Look_Float(47)		
201	Lookable Float - 48	float	Look_Float(48)		
205	Lookable Float - 49	float	Look_Float(49)		
209	Lookable Float - 50	float	Look_Float(50)		
213	Lookable Float - 51	float	Look_Float(51)		
217	Lookable Float - 52	float	Look_Float(52)		
221	Lookable Float - 53	float	Look_Float(53)		
225	Lookable Float - 54	float	Look_Float(54)		
229	Lookable Float - 55	float	Look_Float(55)		
233	Lookable Float - 56	float	Look_Float(56)		
237	Lookable Float - 57	float	Look_Float(57)		
241	Lookable Float - 58	float	Look_Float(58)		
245	Lookable Float - 59	float	Look_Float(59)		
249	Lookable Float - 60	float	Look_Float(60)		
253	Lookable Float - 61	float	Look_Float(61)		
257	Lookable Float - 62	float	Look_Float(62)		
261	Lookable Float - 63	float	Look_Float(63)		
265	Lookable Float - 64	float	Look_Float(64)		
269	Lookable Float - 65	float	Look_Float(65)		
273	Lookable Float - 66	float	Look_Float(66)		
277	Lookable Float - 67	float	Look_Float(67)		
281	Lookable Float - 68	float	Look_Float(68)		
285	Lookable Float - 69	float	Look_Float(69)		
289	Lookable Float - 70	float	Look_Float(70)		
293	Lookable Float - 71	float	Look_Float(71)		
297	Lookable Float - 72	float	Look_Float(72)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Lookable Float - 73	float	Look_Float(73)		
305	Lookable Float - 74	float	Look_Float(74)		
309	Lookable Float - 75	float	Look_Float(75)		
313	Lookable Float - 76	float	Look_Float(76)		
317	Lookable Float - 77	float	Look_Float(77)		
321	Lookable Float - 78	float	Look_Float(78)		
325	Lookable Float - 79	float	Look_Float(79)		
329	Lookable Float - 80	float	Look_Float(80)		
333	Lookable Float - 81	float	Look_Float(81)		
337	Lookable Float - 82	float	Look_Float(82)		
341	Lookable Float - 83	float	Look_Float(83)		
345	Lookable Float - 84	float	Look_Float(84)		
349	Lookable Float - 85	float	Look_Float(85)		
353	Lookable Float - 86	float	Look_Float(86)		
357	Lookable Float - 87	float	Look_Float(87)		
361	Lookable Float - 88	float	Look_Float(88)		
365	Lookable Float - 89	float	Look_Float(89)		
369	Lookable Float - 90	float	Look_Float(90)		
373	Lookable Float - 91	float	Look_Float(91)		
377	Lookable Float - 92	float	Look_Float(92)		
381	Lookable Float - 93	float	Look_Float(93)		
385	Lookable Float - 94	float	Look_Float(94)		
389	Lookable Float - 95	float	Look_Float(95)		
393	Lookable Float - 96	float	Look_Float(96)		
397	Lookable Float - 97	float	Look_Float(97)		
401	Lookable Float - 98	float	Look_Float(98)		
405	Lookable Float - 99	float	Look_Float(99)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
409	Lookable Float - 100	float	Look_Float(100)		
413	Lookable Float - 101	float	Look_Float(101)		
417	Lookable Float - 102	float	Look_Float(102)		
421	Lookable Float - 103	float	Look_Float(103)		
425	Lookable Float - 104	float	Look_Float(104)		
429	Lookable Float - 105	float	Look_Float(105)		
433	Lookable Float - 106	float	Look_Float(106)		
437	Lookable Float - 107	float	Look_Float(107)		
441	Lookable Float - 108	float	Look_Float(108)		
445	Lookable Float - 109	float	Look_Float(109)		
449	Lookable Float - 110	float	Look_Float(110)		
453	Lookable Float - 111	float	Look_Float(111)		
457	Lookable Float - 112	float	Look_Float(112)		
461	Lookable Float - 113	float	Look_Float(113)		
465	Lookable Float - 114	float	Look_Float(114)		
469	Lookable Float - 115	float	Look_Float(115)		
473	Lookable Float - 116	float	Look_Float(116)		
477	Lookable Float - 117	float	Look_Float(117)		
481	Lookable Float - 118	float	Look_Float(118)		
485	Lookable Float - 119	float	Look_Float(119)		
489	Lookable Float - 120	float	Look_Float(120)		
493	Lookable Float - 121	float	Look_Float(121)		
497	Lookable Float - 122	float	Look_Float(122)		
501	Lookable Float - 123	float	Look_Float(123)		
505	Lookable Float - 124	float	Look_Float(124)		
509	Lookable Float - 125	float	Look_Float(125)		
513	Lookable Float - 126	float	Look_Float(126)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
517	Lookable Float - 127	float	Look_Float(127)		
521	Lookable Float - 128	float	Look_Float(128)		
525	Lookable Float - 129	float	Look_Float(129)		
529	Lookable Float - 130	float	Look_Float(130)		
533	Lookable Float - 131	float	Look_Float(131)		
537	Lookable Float - 132	float	Look_Float(132)		
541	Lookable Float - 133	float	Look_Float(133)		
545	Lookable Float - 134	float	Look_Float(134)		
549	Lookable Float - 135	float	Look_Float(135)		
553	Lookable Float - 136	float	Look_Float(136)		
557	Lookable Float - 137	float	Look_Float(137)		
561	Lookable Float - 138	float	Look_Float(138)		
565	Lookable Float - 139	float	Look_Float(139)		
569	Lookable Float - 140	float	Look_Float(140)		
573	Lookable Float - 141	float	Look_Float(141)		
577	Lookable Float - 142	float	Look_Float(142)		
581	Lookable Float - 143	float	Look_Float(143)		
585	Lookable Float - 144	float	Look_Float(144)		
589	Lookable Float - 145	float	Look_Float(145)		
593	Lookable Float - 146	float	Look_Float(146)		
597	Lookable Float - 147	float	Look_Float(147)		
601	Lookable Float - 148	float	Look_Float(148)		
605	Lookable Float - 149	float	Look_Float(149)		
609	Lookable Float - 150	float	Look_Float(150)		
613	Lookable Float - 151	float	Look_Float(151)		
617	Lookable Float - 152	float	Look_Float(152)		
621	Lookable Float - 153	float	Look_Float(153)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
625	Lookable Float - 154	float	Look_Float(154)		
629	Lookable Float - 155	float	Look_Float(155)		
633	Lookable Float - 156	float	Look_Float(156)		
637	Lookable Float - 157	float	Look_Float(157)		
641	Lookable Float - 158	float	Look_Float(158)		
645	Lookable Float - 159	float	Look_Float(159)		
649	Lookable Float - 160	float	Look_Float(160)		
653	Lookable Float - 161	float	Look_Float(161)		
657	Lookable Float - 162	float	Look_Float(162)		
661	Lookable Float - 163	float	Look_Float(163)		
665	Lookable Float - 164	float	Look_Float(164)		
669	Lookable Float - 165	float	Look_Float(165)		
673	Lookable Float - 166	float	Look_Float(166)		
677	Lookable Float - 167	float	Look_Float(167)		
681	Lookable Float - 168	float	Look_Float(168)		
685	Lookable Float - 169	float	Look_Float(169)		
689	Lookable Float - 170	float	Look_Float(170)		
693	Lookable Float - 171	float	Look_Float(171)		
697	Lookable Float - 172	float	Look_Float(172)		
701	Lookable Float - 173	float	Look_Float(173)		
705	Lookable Float - 174	float	Look_Float(174)		
709	Lookable Float - 175	float	Look_Float(175)		
713	Lookable Float - 176	float	Look_Float(176)		
717	Lookable Float - 177	float	Look_Float(177)		
721	Lookable Float - 178	float	Look_Float(178)		
725	Lookable Float - 179	float	Look_Float(179)		
729	Lookable Float - 180	float	Look_Float(180)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
733	Lookable Float - 181	float	Look_Float(181)		
737	Lookable Float - 182	float	Look_Float(182)		
741	Lookable Float - 183	float	Look_Float(183)		
745	Lookable Float - 184	float	Look_Float(184)		
749	Lookable Float - 185	float	Look_Float(185)		
753	Lookable Float - 186	float	Look_Float(186)		
757	Lookable Float - 187	float	Look_Float(187)		
761	Lookable Float - 188	float	Look_Float(188)		
765	Lookable Float - 189	float	Look_Float(189)		
769	Lookable Float - 190	float	Look_Float(190)		
773	Lookable Float - 191	float	Look_Float(191)		
777	Lookable Float - 192	float	Look_Float(192)		
781	Lookable Float - 193	float	Look_Float(193)		
785	Lookable Float - 194	float	Look_Float(194)		
789	Lookable Float - 195	float	Look_Float(195)		
793	Lookable Float - 196	float	Look_Float(196)		
797	Lookable Float - 197	float	Look_Float(197)		
801	Lookable Float - 198	float	Look_Float(198)		
805	Lookable Float - 199	float	Look_Float(199)		
809	Lookable Float - 200	float	Look_Float(200)		
813	Lookable Float - 201	float	Look_Float(201)		
817	Lookable Float - 202	float	Look_Float(202)		
821	Lookable Float - 203	float	Look_Float(203)		
825	Lookable Float - 204	float	Look_Float(204)		
829	Lookable Float - 205	float	Look_Float(205)		
833	Lookable Float - 206	float	Look_Float(206)		
837	Lookable Float - 207	float	Look_Float(207)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
841	Lookable Float - 208	float	Look_Float(208)		
845	Lookable Float - 209	float	Look_Float(209)		
849	Lookable Float - 210	float	Look_Float(210)		
853	Lookable Float - 211	float	Look_Float(211)		
857	Lookable Float - 212	float	Look_Float(212)		
861	Lookable Float - 213	float	Look_Float(213)		
865	Lookable Float - 214	float	Look_Float(214)		
869	Lookable Float - 215	float	Look_Float(215)		
873	Lookable Float - 216	float	Look_Float(216)		
877	Lookable Float - 217	float	Look_Float(217)		
881	Lookable Float - 218	float	Look_Float(218)		
885	Lookable Float - 219	float	Look_Float(219)		
889	Lookable Float - 220	float	Look_Float(220)		
893	Lookable Float - 221	float	Look_Float(221)		
897	Lookable Float - 222	float	Look_Float(222)		
901	Lookable Float - 223	float	Look_Float(223)		
905	Lookable Float - 224	float	Look_Float(224)		
909	Lookable Float - 225	float	Look_Float(225)		
913	Lookable Float - 226	float	Look_Float(226)		
917	Lookable Float - 227	float	Look_Float(227)		
921	Lookable Float - 228	float	Look_Float(228)		
925	Lookable Float - 229	float	Look_Float(229)		
929	Lookable Float - 230	float	Look_Float(230)		
933	Lookable Float - 231	float	Look_Float(231)		
937	Lookable Float - 232	float	Look_Float(232)		
941	Lookable Float - 233	float	Look_Float(233)		
945	Lookable Float - 234	float	Look_Float(234)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
949	Lookable Float - 235	float	Look_Float(235)		
953	Lookable Float - 236	float	Look_Float(236)		
957	Lookable Float - 237	float	Look_Float(237)		
961	Lookable Float - 238	float	Look_Float(238)		
965	Lookable Float - 239	float	Look_Float(239)		
969	Lookable Float - 240	float	Look_Float(240)		
973	Lookable Float - 241	float	Look_Float(241)		
977	Lookable Float - 242	float	Look_Float(242)		
981	Lookable Float - 243	float	Look_Float(243)		
985	Lookable Float - 244	float	Look_Float(244)		
989	Lookable Float - 245	float	Look_Float(245)		
993	Lookable Float - 246	float	Look_Float(246)		
997	Lookable Float - 247	float	Look_Float(247)		
1001	Lookable Float - 248	float	Look_Float(248)		
1005	Lookable Float - 249	float	Look_Float(249)		
1009	Lookable Float - 250	float	Look_Float(250)		
1013	Lookable Float - 251	float	Look_Float(251)		
1017	Lookable Float - 252	float	Look_Float(252)		
1021	Lookable Float - 253	float	Look_Float(253)		
1025	Lookable Float - 254	float	Look_Float(254)		
1029	Lookable Float - 255	float	Look_Float(255)		
1033	Lookable Float - 256	float	Look_Float(256)		
1037	Lookable Float - 257	float	Look_Float(257)		
1041	Lookable Float - 258	float	Look_Float(258)		
1045	Lookable Float - 259	float	Look_Float(259)		
1049	Lookable Float - 260	float	Look_Float(260)		
1053	Lookable Float - 261	float	Look_Float(261)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1057	Lookable Float - 262	float	Look_Float(262)		
1061	Lookable Float - 263	float	Look_Float(263)		
1065	Lookable Float - 264	float	Look_Float(264)		
1069	Lookable Float - 265	float	Look_Float(265)		
1073	Lookable Float - 266	float	Look_Float(266)		
1077	Lookable Float - 267	float	Look_Float(267)		
1081	Lookable Float - 268	float	Look_Float(268)		
1085	Lookable Float - 269	float	Look_Float(269)		
1089	Lookable Float - 270	float	Look_Float(270)		
1093	Lookable Float - 271	float	Look_Float(271)		
1097	Lookable Float - 272	float	Look_Float(272)		
1101	Lookable Float - 273	float	Look_Float(273)		
1105	Lookable Float - 274	float	Look_Float(274)		
1109	Lookable Float - 275	float	Look_Float(275)		
1113	Lookable Float - 276	float	Look_Float(276)		
1117	Lookable Float - 277	float	Look_Float(277)		
1121	Lookable Float - 278	float	Look_Float(278)		
1125	Lookable Float - 279	float	Look_Float(279)		
1129	Lookable Float - 280	float	Look_Float(280)		
1133	Lookable Float - 281	float	Look_Float(281)		
1137	Lookable Float - 282	float	Look_Float(282)		
1141	Lookable Float - 283	float	Look_Float(283)		
1145	Lookable Float - 284	float	Look_Float(284)		
1149	Lookable Float - 285	float	Look_Float(285)		
1153	Lookable Float - 286	float	Look_Float(286)		
1157	Lookable Float - 287	float	Look_Float(287)		
1161	Lookable Float - 288	float	Look_Float(288)		

Table 30.6-III PTS Data Message Format 2 Layout – Lookable Float (1 to 300)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1165	Lookable Float - 289	float	Look_Float(289)		
1169	Lookable Float - 290	float	Look_Float(290)		
1173	Lookable Float - 291	float	Look_Float(291)		
1177	Lookable Float - 292	float	Look_Float(292)		
1181	Lookable Float - 293	float	Look_Float(293)		
1185	Lookable Float - 294	float	Look_Float(294)		
1189	Lookable Float - 295	float	Look_Float(295)		
1193	Lookable Float - 296	float	Look_Float(296)		
1197	Lookable Float - 297	float	Look_Float(297)		
1201	Lookable Float - 298	float	Look_Float(298)		
1205	Lookable Float - 299	float	Look_Float(299)		
1209	Lookable Float - 300	float	Look_Float(300)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 13 for PTS Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 812
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 3 for this message
****	** Data parameters**	**800 bytes	******	******	******
13	Lookable Integer_32 - 1	int_32	Look_Integer_32(1)		
17	Lookable Integer_32 - 2	int_32	Look_Integer_32(2)		
21	Lookable Integer_32 - 3	int_32	Look_Integer_32(3)		
25	Lookable Integer_32 - 4	int_32	Look_Integer_32(4)		
29	Lookable Integer_32 - 5	int_32	Look_Integer_32(5)		
33	Lookable Integer_32 - 6	int_32	Look_Integer_32(6)		
37	Lookable Integer_32 - 7	int_32	Look_Integer_32(7)		
41	Lookable Integer_32 - 8	int_32	Look_Integer_32(8)		
45	Lookable Integer_32 - 9	int_32	Look_Integer_32(9)		
49	Lookable Integer_32 - 10	int_32	Look_Integer_32(10)		
53	Lookable Integer_32 - 11	int_32	Look_Integer_32(11)		
57	Lookable Integer_32 - 12	int_32	Look_Integer_32(12)		
61	Lookable Integer_32 - 13	int_32	Look_Integer_32(13)		
65	Lookable Integer_32 - 14	int_32	Look_Integer_32(14)		
69	Lookable Integer_32 - 15	int_32	Look_Integer_32(15)		
73	Lookable Integer_32 - 16	int_32	Look_Integer_32(16)		
77	Lookable Integer_32 - 17	int_32	Look_Integer_32(17)		
81	Lookable Integer_32 - 18	int_32	Look_Integer_32(18)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Lookable Integer_32 - 19	int_32	Look_Integer_32(19)		
89	Lookable Integer_32 - 20	int_32	Look_Integer_32(20)		
93	Lookable Integer_32 - 21	int_32	Look_Integer_32(21)		
97	Lookable Integer_32 - 22	int_32	Look_Integer_32(22)		
101	Lookable Integer_32 - 23	int_32	Look_Integer_32(23)		
105	Lookable Integer_32 - 24	int_32	Look_Integer_32(24)		
109	Lookable Integer_32 - 25	int_32	Look_Integer_32(25)		
113	Lookable Integer_32 - 26	int_32	Look_Integer_32(26)		
117	Lookable Integer_32 - 27	int_32	Look_Integer_32(27)		
121	Lookable Integer_32 - 28	int_32	Look_Integer_32(28)		
125	Lookable Integer_32 - 29	int_32	Look_Integer_32(29)		
129	Lookable Integer_32 - 30	int_32	Look_Integer_32(30)		
133	Lookable Integer_32 - 31	int_32	Look_Integer_32(31)		
137	Lookable Integer_32 - 32	int_32	Look_Integer_32(32)		
141	Lookable Integer_32 - 33	int_32	Look_Integer_32(33)		
145	Lookable Integer_32 - 34	int_32	Look_Integer_32(34)		
149	Lookable Integer_32 - 35	int_32	Look_Integer_32(35)		
153	Lookable Integer_32 - 36	int_32	Look_Integer_32(36)		
157	Lookable Integer_32 - 37	int_32	Look_Integer_32(37)		
161	Lookable Integer_32 - 38	int_32	Look_Integer_32(38)		
165	Lookable Integer_32 - 39	int_32	Look_Integer_32(39)		
169	Lookable Integer_32 - 40	int_32	Look_Integer_32(40)		
173	Lookable Integer_32 - 41	int_32	Look_Integer_32(41)		
177	Lookable Integer_32 - 42	int_32	Look_Integer_32(42)		
181	Lookable Integer_32 - 43	int_32	Look_Integer_32(43)		
185	Lookable Integer_32 - 44	int_32	Look_Integer_32(44)		
189	Lookable Integer_32 - 45	int_32	Look_Integer_32(45)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Lookable Integer_32 - 46	int_32	Look_Integer_32(46)		
197	Lookable Integer_32 - 47	int_32	Look_Integer_32(47)		
201	Lookable Integer_32 - 48	int_32	Look_Integer_32(48)		
205	Lookable Integer_32 - 49	int_32	Look_Integer_32(49)		
209	Lookable Integer_32 - 50	int_32	Look_Integer_32(50)		
213	Lookable Integer_32 - 51	int_32	Look_Integer_32(51)		
217	Lookable Integer_32 - 52	int_32	Look_Integer_32(52)		
221	Lookable Integer_32 - 53	int_32	Look_Integer_32(53)		
225	Lookable Integer_32 - 54	int_32	Look_Integer_32(54)		
229	Lookable Integer_32 - 55	int_32	Look_Integer_32(55)		
233	Lookable Integer_32 - 56	int_32	Look_Integer_32(56)		
237	Lookable Integer_32 - 57	int_32	Look_Integer_32(57)		
241	Lookable Integer_32 - 58	int_32	Look_Integer_32(58)		
245	Lookable Integer_32 - 59	int_32	Look_Integer_32(59)		
249	Lookable Integer_32 - 60	int_32	Look_Integer_32(60)		
253	Lookable Integer_32 - 61	int_32	Look_Integer_32(61)		
257	Lookable Integer_32 - 62	int_32	Look_Integer_32(62)		
261	Lookable Integer_32 - 63	int_32	Look_Integer_32(63)		
265	Lookable Integer_32 - 64	int_32	Look_Integer_32(64)		
269	Lookable Integer_32 - 65	int_32	Look_Integer_32(65)		
273	Lookable Integer_32 - 66	int_32	Look_Integer_32(66)		
277	Lookable Integer_32 - 67	int_32	Look_Integer_32(67)		
281	Lookable Integer_32 - 68	int_32	Look_Integer_32(68)		
285	Lookable Integer_32 - 69	int_32	Look_Integer_32(69)		
289	Lookable Integer_32 - 70	int_32	Look_Integer_32(70)		
293	Lookable Integer_32 - 71	int_32	Look_Integer_32(71)		
297	Lookable Integer_32 - 72	int_32	Look_Integer_32(72)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Lookable Integer_32 - 73	int_32	Look_Integer_32(73)		
305	Lookable Integer_32 - 74	int_32	Look_Integer_32(74)		
309	Lookable Integer_32 - 75	int_32	Look_Integer_32(75)		
313	Lookable Integer_32 - 76	int_32	Look_Integer_32(76)		
317	Lookable Integer_32 - 77	int_32	Look_Integer_32(77)		
321	Lookable Integer_32 - 78	int_32	Look_Integer_32(78)		
325	Lookable Integer_32 - 79	int_32	Look_Integer_32(79)		
329	Lookable Integer_32 - 80	int_32	Look_Integer_32(80)		
333	Lookable Integer_32 - 81	int_32	Look_Integer_32(81)		
337	Lookable Integer_32 - 82	int_32	Look_Integer_32(82)		
341	Lookable Integer_32 - 83	int_32	Look_Integer_32(83)		
345	Lookable Integer_32 - 84	int_32	Look_Integer_32(84)		
349	Lookable Integer_32 - 85	int_32	Look_Integer_32(85)		
353	Lookable Integer_32 - 86	int_32	Look_Integer_32(86)		
357	Lookable Integer_32 - 87	int_32	Look_Integer_32(87)		
361	Lookable Integer_32 - 88	int_32	Look_Integer_32(88)		
365	Lookable Integer_32 - 89	int_32	Look_Integer_32(89)		
369	Lookable Integer_32 - 90	int_32	Look_Integer_32(90)		
373	Lookable Integer_32 - 91	int_32	Look_Integer_32(91)		
377	Lookable Integer_32 - 92	int_32	Look_Integer_32(92)		
381	Lookable Integer_32 - 93	int_32	Look_Integer_32(93)		
385	Lookable Integer_32 - 94	int_32	Look_Integer_32(94)		
389	Lookable Integer_32 - 95	int_32	Look_Integer_32(95)		
393	Lookable Integer_32 - 96	int_32	Look_Integer_32(96)		
397	Lookable Integer_32 - 97	int_32	Look_Integer_32(97)		
401	Lookable Integer_32 - 98	int_32	Look_Integer_32(98)		
405	Lookable Integer_32 - 99	int_32	Look_Integer_32(99)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
409	Lookable Integer_32 - 100	int_32	Look_Integer_32(100)		
413	Lookable Integer_32 - 101	int_32	Look_Integer_32(101)		
417	Lookable Integer_32 - 102	int_32	Look_Integer_32(102)		
421	Lookable Integer_32 - 103	int_32	Look_Integer_32(103)		
425	Lookable Integer_32 - 104	int_32	Look_Integer_32(104)		
429	Lookable Integer_32 - 105	int_32	Look_Integer_32(105)		
433	Lookable Integer_32 - 106	int_32	Look_Integer_32(106)		
437	Lookable Integer_32 - 107	int_32	Look_Integer_32(107)		
441	Lookable Integer_32 - 108	int_32	Look_Integer_32(108)		
445	Lookable Integer_32 - 109	int_32	Look_Integer_32(109)		
449	Lookable Integer_32 - 110	int_32	Look_Integer_32(110)		
453	Lookable Integer_32 - 111	int_32	Look_Integer_32(111)		
457	Lookable Integer_32 - 112	int_32	Look_Integer_32(112)		
461	Lookable Integer_32 - 113	int_32	Look_Integer_32(113)		
465	Lookable Integer_32 - 114	int_32	Look_Integer_32(114)		
469	Lookable Integer_32 - 115	int_32	Look_Integer_32(115)		
473	Lookable Integer_32 - 116	int_32	Look_Integer_32(116)		
477	Lookable Integer_32 - 117	int_32	Look_Integer_32(117)		
481	Lookable Integer_32 - 118	int_32	Look_Integer_32(118)		
485	Lookable Integer_32 - 119	int_32	Look_Integer_32(119)		
489	Lookable Integer_32 - 120	int_32	Look_Integer_32(120)		
493	Lookable Integer_32 - 121	int_32	Look_Integer_32(121)		
497	Lookable Integer_32 - 122	int_32	Look_Integer_32(122)		
501	Lookable Integer_32 - 123	int_32	Look_Integer_32(123)		
505	Lookable Integer_32 - 124	int_32	Look_Integer_32(124)		
509	Lookable Integer_32 - 125	int_32	Look_Integer_32(125)		
513	Lookable Integer_32 - 126	int_32	Look_Integer_32(126)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
517	Lookable Integer_32 - 127	int_32	Look_Integer_32(127)		
521	Lookable Integer_32 - 128	int_32	Look_Integer_32(128)		
525	Lookable Integer_32 - 129	int_32	Look_Integer_32(129)		
529	Lookable Integer_32 - 130	int_32	Look_Integer_32(130)		
533	Lookable Integer_32 - 131	int_32	Look_Integer_32(131)		
537	Lookable Integer_32 - 132	int_32	Look_Integer_32(132)		
541	Lookable Integer_32 - 133	int_32	Look_Integer_32(133)		
545	Lookable Integer_32 - 134	int_32	Look_Integer_32(134)		
549	Lookable Integer_32 - 135	int_32	Look_Integer_32(135)		
553	Lookable Integer_32 - 136	int_32	Look_Integer_32(136)		
557	Lookable Integer_32 - 137	int_32	Look_Integer_32(137)		
561	Lookable Integer_32 - 138	int_32	Look_Integer_32(138)		
565	Lookable Integer_32 - 139	int_32	Look_Integer_32(139)		
569	Lookable Integer_32 - 140	int_32	Look_Integer_32(140)		
573	Lookable Integer_32 - 141	int_32	Look_Integer_32(141)		
577	Lookable Integer_32 - 142	int_32	Look_Integer_32(142)		
581	Lookable Integer_32 - 143	int_32	Look_Integer_32(143)		
585	Lookable Integer_32 - 144	int_32	Look_Integer_32(144)		
589	Lookable Integer_32 - 145	int_32	Look_Integer_32(145)		
593	Lookable Integer_32 - 146	int_32	Look_Integer_32(146)		
597	Lookable Integer_32 - 147	int_32	Look_Integer_32(147)		
601	Lookable Integer_32 - 148	int_32	Look_Integer_32(148)		
605	Lookable Integer_32 - 149	int_32	Look_Integer_32(149)		
609	Lookable Integer_32 - 150	int_32	Look_Integer_32(150)		
613	Lookable Integer_32 - 151	int_32	Look_Integer_32(151)		
617	Lookable Integer_32 - 152	int_32	Look_Integer_32(152)		
621	Lookable Integer_32 - 153	int_32	Look_Integer_32(153)		

Table 30.6-IV   PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
625	Lookable Integer_32 - 154	int_32	Look_Integer_32(154)		
629	Lookable Integer_32 - 155	int_32	Look_Integer_32(155)		
633	Lookable Integer_32 - 156	int_32	Look_Integer_32(156)		
637	Lookable Integer_32 - 157	int_32	Look_Integer_32(157)		
641	Lookable Integer_32 - 158	int_32	Look_Integer_32(158)		
645	Lookable Integer_32 - 159	int_32	Look_Integer_32(159)		
649	Lookable Integer_32 - 160	int_32	Look_Integer_32(160)		
653	Lookable Integer_32 - 161	int_32	Look_Integer_32(161)		
657	Lookable Integer_32 - 162	int_32	Look_Integer_32(162)		
661	Lookable Integer_32 - 163	int_32	Look_Integer_32(163)		
665	Lookable Integer_32 - 164	int_32	Look_Integer_32(164)		
669	Lookable Integer_32 - 165	int_32	Look_Integer_32(165)		
673	Lookable Integer_32 - 166	int_32	Look_Integer_32(166)		
677	Lookable Integer_32 - 167	int_32	Look_Integer_32(167)		
681	Lookable Integer_32 - 168	int_32	Look_Integer_32(168)		
685	Lookable Integer_32 - 169	int_32	Look_Integer_32(169)		
689	Lookable Integer_32 - 170	int_32	Look_Integer_32(170)		
693	Lookable Integer_32 - 171	int_32	Look_Integer_32(171)		
697	Lookable Integer_32 - 172	int_32	Look_Integer_32(172)		
701	Lookable Integer_32 - 173	int_32	Look_Integer_32(173)		
705	Lookable Integer_32 - 174	int_32	Look_Integer_32(174)		
709	Lookable Integer_32 - 175	int_32	Look_Integer_32(175)		
713	Lookable Integer_32 - 176	int_32	Look_Integer_32(176)		
717	Lookable Integer_32 - 177	int_32	Look_Integer_32(177)		
721	Lookable Integer_32 - 178	int_32	Look_Integer_32(178)		
725	Lookable Integer_32 - 179	int_32	Look_Integer_32(179)		
729	Lookable Integer_32 - 180	int_32	Look_Integer_32(180)		

Table 30.6-IV PTS Data Message Format 3 Layout – Lookable Integer_32 (1 to 200)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
733	Lookable Integer_32 - 181	int_32	Look_Integer_32(181)		
737	Lookable Integer_32 - 182	int_32	Look_Integer_32(182)		
741	Lookable Integer_32 - 183	int_32	Look_Integer_32(183)		
745	Lookable Integer_32 - 184	int_32	Look_Integer_32(184)		
749	Lookable Integer_32 - 185	int_32	Look_Integer_32(185)		
753	Lookable Integer_32 - 186	int_32	Look_Integer_32(186)		
757	Lookable Integer_32 - 187	int_32	Look_Integer_32(187)		
761	Lookable Integer_32 - 188	int_32	Look_Integer_32(188)		
765	Lookable Integer_32 - 189	int_32	Look_Integer_32(189)		
769	Lookable Integer_32 - 190	int_32	Look_Integer_32(190)		
773	Lookable Integer_32 - 191	int_32	Look_Integer_32(191)		
777	Lookable Integer_32 - 192	int_32	Look_Integer_32(192)		
781	Lookable Integer_32 - 193	int_32	Look_Integer_32(193)		
785	Lookable Integer_32 - 194	int_32	Look_Integer_32(194)		
789	Lookable Integer_32 - 195	int_32	Look_Integer_32(195)		
793	Lookable Integer_32 - 196	int_32	Look_Integer_32(196)		
797	Lookable Integer_32 - 197	int_32	Look_Integer_32(197)		
801	Lookable Integer_32 - 198	int_32	Look_Integer_32(198)		
805	Lookable Integer_32 - 199	int_32	Look_Integer_32(199)		
809	Lookable Integer_32 - 200	int_32	Look_Integer_32(200)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 13 for PTS Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 812
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 4 for this message
***	** Data parameters**	**800 bytes	******	******	******
13	Lookable Integer_32 - 201	int_32	Look_Integer_32(201)		
17	Lookable Integer_32 - 202	int_32	Look_Integer_32(202)		
21	Lookable Integer_32 - 203	int_32	Look_Integer_32(203)		
25	Lookable Integer_32 - 204	int_32	Look_Integer_32(204)		
29	Lookable Integer_32 - 205	int_32	Look_Integer_32(205)		
33	Lookable Integer_32 - 206	int_32	Look_Integer_32(206)		
37	Lookable Integer_32 - 207	int_32	Look_Integer_32(207)		
41	Lookable Integer_32 - 208	int_32	Look_Integer_32(208)		
45	Lookable Integer_32 - 209	int_32	Look_Integer_32(209)		
49	Lookable Integer_32 - 210	int_32	Look_Integer_32(210)		
53	Lookable Integer_32 - 211	int_32	Look_Integer_32(211)		
57	Lookable Integer_32 - 212	int_32	Look_Integer_32(212)		
61	Lookable Integer_32 - 213	int_32	Look_Integer_32(213)		
65	Lookable Integer_32 - 214	int_32	Look_Integer_32(214)		
69	Lookable Integer_32 - 215	int_32	Look_Integer_32(215)		
73	Lookable Integer_32 - 216	int_32	Look_Integer_32(216)		
77	Lookable Integer_32 - 217	int_32	Look_Integer_32(217)		
81	Lookable Integer_32 - 218	int_32	Look_Integer_32(218)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Lookable Integer_32 - 219	int_32	Look_Integer_32(219)		
89	Lookable Integer_32 - 220	int_32	Look_Integer_32(220)		
93	Lookable Integer_32 - 221	int_32	Look_Integer_32(221)		
97	Lookable Integer_32 - 222	int_32	Look_Integer_32(222)		
101	Lookable Integer_32 - 223	int_32	Look_Integer_32(223)		
105	Lookable Integer_32 - 224	int_32	Look_Integer_32(224)		
109	Lookable Integer_32 - 225	int_32	Look_Integer_32(225)		
113	Lookable Integer_32 - 226	int_32	Look_Integer_32(226)		
117	Lookable Integer_32 - 227	int_32	Look_Integer_32(227)		
121	Lookable Integer_32 - 228	int_32	Look_Integer_32(228)		
125	Lookable Integer_32 - 229	int_32	Look_Integer_32(229)		
129	Lookable Integer_32 - 230	int_32	Look_Integer_32(230)		
133	Lookable Integer_32 - 231	int_32	Look_Integer_32(231)		
137	Lookable Integer_32 - 232	int_32	Look_Integer_32(232)		
141	Lookable Integer_32 - 233	int_32	Look_Integer_32(233)		
145	Lookable Integer_32 - 234	int_32	Look_Integer_32(234)		
149	Lookable Integer_32 - 235	int_32	Look_Integer_32(235)		
153	Lookable Integer_32 - 236	int_32	Look_Integer_32(236)		
157	Lookable Integer_32 - 237	int_32	Look_Integer_32(237)		
161	Lookable Integer_32 - 238	int_32	Look_Integer_32(238)		
165	Lookable Integer_32 - 239	int_32	Look_Integer_32(239)		
169	Lookable Integer_32 - 240	int_32	Look_Integer_32(240)		
173	Lookable Integer_32 - 241	int_32	Look_Integer_32(241)		
177	Lookable Integer_32 - 242	int_32	Look_Integer_32(242)		
181	Lookable Integer_32 - 243	int_32	Look_Integer_32(243)		
185	Lookable Integer_32 - 244	int_32	Look_Integer_32(244)		
189	Lookable Integer_32 - 245	int_32	Look_Integer_32(245)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Lookable Integer_32 - 246	int_32	Look_Integer_32(246)		
197	Lookable Integer_32 - 247	int_32	Look_Integer_32(247)		
201	Lookable Integer_32 - 248	int_32	Look_Integer_32(248)		
205	Lookable Integer_32 - 249	int_32	Look_Integer_32(249)		
209	Lookable Integer_32 - 250	int_32	Look_Integer_32(250)		
213	Lookable Integer_32 - 251	int_32	Look_Integer_32(251)		
217	Lookable Integer_32 - 252	int_32	Look_Integer_32(252)		
221	Lookable Integer_32 - 253	int_32	Look_Integer_32(253)		
225	Lookable Integer_32 - 254	int_32	Look_Integer_32(254)		
229	Lookable Integer_32 - 255	int_32	Look_Integer_32(255)		
233	Lookable Integer_32 - 256	int_32	Look_Integer_32(256)		
237	Lookable Integer_32 - 257	int_32	Look_Integer_32(257)		
241	Lookable Integer_32 - 258	int_32	Look_Integer_32(258)		
245	Lookable Integer_32 - 259	int_32	Look_Integer_32(259)		
249	Lookable Integer_32 - 260	int_32	Look_Integer_32(260)		
253	Lookable Integer_32 - 261	int_32	Look_Integer_32(261)		
257	Lookable Integer_32 - 262	int_32	Look_Integer_32(262)		
261	Lookable Integer_32 - 263	int_32	Look_Integer_32(263)		
265	Lookable Integer_32 - 264	int_32	Look_Integer_32(264)		
269	Lookable Integer_32 - 265	int_32	Look_Integer_32(265)		
273	Lookable Integer_32 - 266	int_32	Look_Integer_32(266)		
277	Lookable Integer_32 - 267	int_32	Look_Integer_32(267)		
281	Lookable Integer_32 - 268	int_32	Look_Integer_32(268)		
285	Lookable Integer_32 - 269	int_32	Look_Integer_32(269)		
289	Lookable Integer_32 - 270	int_32	Look_Integer_32(270)		
293	Lookable Integer_32 - 271	int_32	Look_Integer_32(271)		
297	Lookable Integer_32 - 272	int_32	Look_Integer_32(272)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Lookable Integer_32 - 273	int_32	Look_Integer_32(273)		
305	Lookable Integer_32 - 274	int_32	Look_Integer_32(274)		
309	Lookable Integer_32 - 275	int_32	Look_Integer_32(275)		
313	Lookable Integer_32 - 276	int_32	Look_Integer_32(276)		
317	Lookable Integer_32 - 277	int_32	Look_Integer_32(277)		
321	Lookable Integer_32 - 278	int_32	Look_Integer_32(278)		
325	Lookable Integer_32 - 279	int_32	Look_Integer_32(279)		
329	Lookable Integer_32 - 280	int_32	Look_Integer_32(280)		
333	Lookable Integer_32 - 281	int_32	Look_Integer_32(281)		
337	Lookable Integer_32 - 282	int_32	Look_Integer_32(282)		
341	Lookable Integer_32 - 283	int_32	Look_Integer_32(283)		
345	Lookable Integer_32 - 284	int_32	Look_Integer_32(284)		
349	Lookable Integer_32 - 285	int_32	Look_Integer_32(285)		
353	Lookable Integer_32 - 286	int_32	Look_Integer_32(286)		
357	Lookable Integer_32 - 287	int_32	Look_Integer_32(287)		
361	Lookable Integer_32 - 288	int_32	Look_Integer_32(288)		
365	Lookable Integer_32 - 289	int_32	Look_Integer_32(289)		
369	Lookable Integer_32 - 290	int_32	Look_Integer_32(290)		
373	Lookable Integer_32 - 291	int_32	Look_Integer_32(291)		
377	Lookable Integer_32 - 292	int_32	Look_Integer_32(292)		
381	Lookable Integer_32 - 293	int_32	Look_Integer_32(293)		
385	Lookable Integer_32 - 294	int_32	Look_Integer_32(294)		
389	Lookable Integer_32 - 295	int_32	Look_Integer_32(295)		
393	Lookable Integer_32 - 296	int_32	Look_Integer_32(296)		
397	Lookable Integer_32 - 297	int_32	Look_Integer_32(297)		
401	Lookable Integer_32 - 298	int_32	Look_Integer_32(298)		
405	Lookable Integer_32 - 299	int_32	Look_Integer_32(299)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
409	Lookable Integer_32 - 300	int_32	Look_Integer_32(300)		
413	Lookable Integer_32 - 301	int_32	Look_Integer_32(301)		
417	Lookable Integer_32 - 302	int_32	Look_Integer_32(302)		
421	Lookable Integer_32 - 303	int_32	Look_Integer_32(303)		
425	Lookable Integer_32 - 304	int_32	Look_Integer_32(304)		
429	Lookable Integer_32 - 305	int_32	Look_Integer_32(305)		
433	Lookable Integer_32 - 306	int_32	Look_Integer_32(306)		
437	Lookable Integer_32 - 307	int_32	Look_Integer_32(307)		
441	Lookable Integer_32 - 308	int_32	Look_Integer_32(308)		
445	Lookable Integer_32 - 309	int_32	Look_Integer_32(309)		
449	Lookable Integer_32 - 310	int_32	Look_Integer_32(310)		
453	Lookable Integer_32 - 311	int_32	Look_Integer_32(311)		
457	Lookable Integer_32 - 312	int_32	Look_Integer_32(312)		
461	Lookable Integer_32 - 313	int_32	Look_Integer_32(313)		
465	Lookable Integer_32 - 314	int_32	Look_Integer_32(314)		
469	Lookable Integer_32 - 315	int_32	Look_Integer_32(315)		
473	Lookable Integer_32 - 316	int_32	Look_Integer_32(316)		
477	Lookable Integer_32 - 317	int_32	Look_Integer_32(317)		
481	Lookable Integer_32 - 318	int_32	Look_Integer_32(318)		
485	Lookable Integer_32 - 319	int_32	Look_Integer_32(319)		
489	Lookable Integer_32 - 320	int_32	Look_Integer_32(320)		
493	Lookable Integer_32 - 321	int_32	Look_Integer_32(321)		
497	Lookable Integer_32 - 322	int_32	Look_Integer_32(322)		
501	Lookable Integer_32 - 323	int_32	Look_Integer_32(323)		
505	Lookable Integer_32 - 324	int_32	Look_Integer_32(324)		
509	Lookable Integer_32 - 325	int_32	Look_Integer_32(325)		
513	Lookable Integer_32 - 326	int_32	Look_Integer_32(326)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
517	Lookable Integer_32 - 327	int_32	Look_Integer_32(327)		
521	Lookable Integer_32 - 328	int_32	Look_Integer_32(328)		
525	Lookable Integer_32 - 329	int_32	Look_Integer_32(329)		
529	Lookable Integer_32 - 330	int_32	Look_Integer_32(330)		
533	Lookable Integer_32 - 331	int_32	Look_Integer_32(331)		
537	Lookable Integer_32 - 332	int_32	Look_Integer_32(332)		
541	Lookable Integer_32 - 333	int_32	Look_Integer_32(333)		
545	Lookable Integer_32 - 334	int_32	Look_Integer_32(334)		
549	Lookable Integer_32 - 335	int_32	Look_Integer_32(335)		
553	Lookable Integer_32 - 336	int_32	Look_Integer_32(336)		
557	Lookable Integer_32 - 337	int_32	Look_Integer_32(337)		
561	Lookable Integer_32 - 338	int_32	Look_Integer_32(338)		
565	Lookable Integer_32 - 339	int_32	Look_Integer_32(339)		
569	Lookable Integer_32 - 340	int_32	Look_Integer_32(340)		
573	Lookable Integer_32 - 341	int_32	Look_Integer_32(341)		
577	Lookable Integer_32 - 342	int_32	Look_Integer_32(342)		
581	Lookable Integer_32 - 343	int_32	Look_Integer_32(343)		
585	Lookable Integer_32 - 344	int_32	Look_Integer_32(344)		
589	Lookable Integer_32 - 345	int_32	Look_Integer_32(345)		
593	Lookable Integer_32 - 346	int_32	Look_Integer_32(346)		
597	Lookable Integer_32 - 347	int_32	Look_Integer_32(347)		
601	Lookable Integer_32 - 348	int_32	Look_Integer_32(348)		
605	Lookable Integer_32 - 349	int_32	Look_Integer_32(349)		
609	Lookable Integer_32 - 350	int_32	Look_Integer_32(350)		
613	Lookable Integer_32 - 351	int_32	Look_Integer_32(351)		
617	Lookable Integer_32 - 352	int_32	Look_Integer_32(352)		
621	Lookable Integer_32 - 353	int_32	Look_Integer_32(353)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
625	Lookable Integer_32 - 354	int_32	Look_Integer_32(354)		
629	Lookable Integer_32 - 355	int_32	Look_Integer_32(355)		
633	Lookable Integer_32 - 356	int_32	Look_Integer_32(356)		
637	Lookable Integer_32 - 357	int_32	Look_Integer_32(357)		
641	Lookable Integer_32 - 358	int_32	Look_Integer_32(358)		
645	Lookable Integer_32 - 359	int_32	Look_Integer_32(359)		
649	Lookable Integer_32 - 360	int_32	Look_Integer_32(360)		
653	Lookable Integer_32 - 361	int_32	Look_Integer_32(361)		
657	Lookable Integer_32 - 362	int_32	Look_Integer_32(362)		
661	Lookable Integer_32 - 363	int_32	Look_Integer_32(363)		
665	Lookable Integer_32 - 364	int_32	Look_Integer_32(364)		
669	Lookable Integer_32 - 365	int_32	Look_Integer_32(365)		
673	Lookable Integer_32 - 366	int_32	Look_Integer_32(366)		
677	Lookable Integer_32 - 367	int_32	Look_Integer_32(367)		
681	Lookable Integer_32 - 368	int_32	Look_Integer_32(368)		
685	Lookable Integer_32 - 369	int_32	Look_Integer_32(369)		
689	Lookable Integer_32 - 370	int_32	Look_Integer_32(370)		
693	Lookable Integer_32 - 371	int_32	Look_Integer_32(371)		
697	Lookable Integer_32 - 372	int_32	Look_Integer_32(372)		
701	Lookable Integer_32 - 373	int_32	Look_Integer_32(373)		
705	Lookable Integer_32 - 374	int_32	Look_Integer_32(374)		
709	Lookable Integer_32 - 375	int_32	Look_Integer_32(375)		
713	Lookable Integer_32 - 376	int_32	Look_Integer_32(376)		
717	Lookable Integer_32 - 377	int_32	Look_Integer_32(377)		
721	Lookable Integer_32 - 378	int_32	Look_Integer_32(378)		
725	Lookable Integer_32 - 379	int_32	Look_Integer_32(379)		
729	Lookable Integer_32 - 380	int_32	Look_Integer_32(380)		

Table 30.6-V PTS Data Message Format 4 Layout – Lookable Integer_32 (201 to 400)

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
733	Lookable Integer_32 - 381	int_32	Look_Integer_32(381)		
737	Lookable Integer_32 - 382	int_32	Look_Integer_32(382)		
741	Lookable Integer_32 - 383	int_32	Look_Integer_32(383)		
745	Lookable Integer_32 - 384	int_32	Look_Integer_32(384)		
749	Lookable Integer_32 - 385	int_32	Look_Integer_32(385)		
753	Lookable Integer_32 - 386	int_32	Look_Integer_32(386)		
757	Lookable Integer_32 - 387	int_32	Look_Integer_32(387)		
761	Lookable Integer_32 - 388	int_32	Look_Integer_32(388)		
765	Lookable Integer_32 - 389	int_32	Look_Integer_32(389)		
769	Lookable Integer_32 - 390	int_32	Look_Integer_32(390)		
773	Lookable Integer_32 - 391	int_32	Look_Integer_32(391)		
777	Lookable Integer_32 - 392	int_32	Look_Integer_32(392)		
781	Lookable Integer_32 - 393	int_32	Look_Integer_32(393)		
785	Lookable Integer_32 - 394	int_32	Look_Integer_32(394)		
789	Lookable Integer_32 - 395	int_32	Look_Integer_32(395)		
793	Lookable Integer_32 - 396	int_32	Look_Integer_32(396)		
797	Lookable Integer_32 - 397	int_32	Look_Integer_32(397)		
801	Lookable Integer_32 - 398	int_32	Look_Integer_32(398)		
805	Lookable Integer_32 - 399	int_32	Look_Integer_32(399)		
809	Lookable Integer_32 - 400	int_32	Look_Integer_32(400)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 13 for PTS Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 1112
9	Sequence Number	unsigned_16	none		Not used
11	Control Field	unsigned_16	none		Format number = 5 for this message
****	** Data parameters**	*1100 bytes	******	******	******
13	Lookable Integer_16 - 1	int_16	Look_Integer_16(1)		
15	Lookable Integer_16 - 2	int_16	Look_Integer_16(2)		
17	Lookable Integer_16 - 3	int_16	Look_Integer_16(3)		
19	Lookable Integer_16 - 4	int_16	Look_Integer_16(4)		
21	Lookable Integer_16 - 5	int_16	Look_Integer_16(5)		
23	Lookable Integer_16 - 6	int_16	Look_Integer_16(6)		
25	Lookable Integer_16 - 7	int_16	Look_Integer_16(7)		
27	Lookable Integer_16 - 8	int_16	Look_Integer_16(8)		
29	Lookable Integer_16 - 9	int_16	Look_Integer_16(9)		
31	Lookable Integer_16 - 10	int_16	Look_Integer_16(10)		
33	Lookable Integer_16 - 11	int_16	Look_Integer_16(11)		
35	Lookable Integer_16 - 12	int_16	Look_Integer_16(12)		
37	Lookable Integer_16 - 13	int_16	Look_Integer_16(13)		
39	Lookable Integer_16 - 14	int_16	Look_Integer_16(14)		
41	Lookable Integer_16 - 15	int_16	Look_Integer_16(15)		
43	Lookable Integer_16 - 16	int_16	Look_Integer_16(16)		
45	Lookable Integer_16 - 17	int_16	Look_Integer_16(17)		
47	Lookable Integer_16 - 18	int_16	Look_Integer_16(18)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
49	Lookable Integer_16 - 19	int_16	Look_Integer_16(19)		
51	Lookable Integer_16 - 20	int_16	Look_Integer_16(20)		
53	Lookable Integer_16 - 21	int_16	Look_Integer_16(21)		
55	Lookable Integer_16 - 22	int_16	Look_Integer_16(22)		
57	Lookable Integer_16 - 23	int_16	Look_Integer_16(23)		
59	Lookable Integer_16 - 24	int_16	Look_Integer_16(24)		
61	Lookable Integer_16 - 25	int_16	Look_Integer_16(25)		
63	Lookable Integer_16 - 26	int_16	Look_Integer_16(26)		
65	Lookable Integer_16 - 27	int_16	Look_Integer_16(27)		
67	Lookable Integer_16 - 28	int_16	Look_Integer_16(28)		
69	Lookable Integer_16 - 29	int_16	Look_Integer_16(29)		
71	Lookable Integer_16 - 30	int_16	Look_Integer_16(30)		
73	Lookable Integer_16 - 31	int_16	Look_Integer_16(31)		
75	Lookable Integer_16 - 32	int_16	Look_Integer_16(32)		
77	Lookable Integer_16 - 33	int_16	Look_Integer_16(33)		
79	Lookable Integer_16 - 34	int_16	Look_Integer_16(34)		
81	Lookable Integer_16 - 35	int_16	Look_Integer_16(35)		
83	Lookable Integer_16 - 36	int_16	Look_Integer_16(36)		
85	Lookable Integer_16 - 37	int_16	Look_Integer_16(37)		
87	Lookable Integer_16 - 38	int_16	Look_Integer_16(38)		
89	Lookable Integer_16 - 39	int_16	Look_Integer_16(39)		
91	Lookable Integer_16 - 40	int_16	Look_Integer_16(40)		
93	Lookable Integer_16 - 41	int_16	Look_Integer_16(41)		
95	Lookable Integer_16 - 42	int_16	Look_Integer_16(42)		
97	Lookable Integer_16 - 43	int_16	Look_Integer_16(43)		
99	Lookable Integer_16 - 44	int_16	Look_Integer_16(44)		
101	Lookable Integer_16 - 45	int_16	Look_Integer_16(45)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
103	Lookable Integer_16 - 46	int_16	Look_Integer_16(46)		
105	Lookable Integer_16 - 47	int_16	Look_Integer_16(47)		
107	Lookable Integer_16 - 48	int_16	Look_Integer_16(48)		
109	Lookable Integer_16 - 49	int_16	Look_Integer_16(49)		
111	Lookable Integer_16 - 50	int_16	Look_Integer_16(50)		
113	Lookable Integer_16 - 51	int_16	Look_Integer_16(51)		
115	Lookable Integer_16 - 52	int_16	Look_Integer_16(52)		
117	Lookable Integer_16 - 53	int_16	Look_Integer_16(53)		
119	Lookable Integer_16 - 54	int_16	Look_Integer_16(54)		
121	Lookable Integer_16 - 55	int_16	Look_Integer_16(55)		
123	Lookable Integer_16 - 56	int_16	Look_Integer_16(56)		
125	Lookable Integer_16 - 57	int_16	Look_Integer_16(57)		
127	Lookable Integer_16 - 58	int_16	Look_Integer_16(58)		
129	Lookable Integer_16 - 59	int_16	Look_Integer_16(59)		
131	Lookable Integer_16 - 60	int_16	Look_Integer_16(60)		
133	Lookable Integer_16 - 61	int_16	Look_Integer_16(61)		
135	Lookable Integer_16 - 62	int_16	Look_Integer_16(62)		
137	Lookable Integer_16 - 63	int_16	Look_Integer_16(63)		
139	Lookable Integer_16 - 64	int_16	Look_Integer_16(64)		
141	Lookable Integer_16 - 65	int_16	Look_Integer_16(65)		
143	Lookable Integer_16 - 66	int_16	Look_Integer_16(66)		
145	Lookable Integer_16 - 67	int_16	Look_Integer_16(67)		
147	Lookable Integer_16 - 68	int_16	Look_Integer_16(68)		
149	Lookable Integer_16 - 69	int_16	Look_Integer_16(69)		
151	Lookable Integer_16 - 70	int_16	Look_Integer_16(70)		
153	Lookable Integer_16 - 71	int_16	Look_Integer_16(71)		
155	Lookable Integer_16 - 72	int_16	Look_Integer_16(72)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
157	Lookable Integer_16 - 73	int_16	Look_Integer_16(73)		
159	Lookable Integer_16 - 74	int_16	Look_Integer_16(74)		
161	Lookable Integer_16 - 75	int_16	Look_Integer_16(75)		
163	Lookable Integer_16 - 76	int_16	Look_Integer_16(76)		
165	Lookable Integer_16 - 77	int_16	Look_Integer_16(77)		
167	Lookable Integer_16 - 78	int_16	Look_Integer_16(78)		
169	Lookable Integer_16 - 79	int_16	Look_Integer_16(79)		
171	Lookable Integer_16 - 80	int_16	Look_Integer_16(80)		
173	Lookable Integer_16 - 81	int_16	Look_Integer_16(81)		
175	Lookable Integer_16 - 82	int_16	Look_Integer_16(82)		
177	Lookable Integer_16 - 83	int_16	Look_Integer_16(83)		
179	Lookable Integer_16 - 84	int_16	Look_Integer_16(84)		
181	Lookable Integer_16 - 85	int_16	Look_Integer_16(85)		
183	Lookable Integer_16 - 86	int_16	Look_Integer_16(86)		
185	Lookable Integer_16 - 87	int_16	Look_Integer_16(87)		
187	Lookable Integer_16 - 88	int_16	Look_Integer_16(88)		
189	Lookable Integer_16 - 89	int_16	Look_Integer_16(89)		
191	Lookable Integer_16 - 90	int_16	Look_Integer_16(90)		
193	Lookable Integer_16 - 91	int_16	Look_Integer_16(91)		
195	Lookable Integer_16 - 92	int_16	Look_Integer_16(92)		
197	Lookable Integer_16 - 93	int_16	Look_Integer_16(93)		
199	Lookable Integer_16 - 94	int_16	Look_Integer_16(94)		
201	Lookable Integer_16 - 95	int_16	Look_Integer_16(95)		
203	Lookable Integer_16 - 96	int_16	Look_Integer_16(96)		
205	Lookable Integer_16 - 97	int_16	Look_Integer_16(97)		
207	Lookable Integer_16 - 98	int_16	Look_Integer_16(98)		
209	Lookable Integer_16 - 99	int_16	Look_Integer_16(99)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
211	Lookable Integer_16 - 100	int_16	Look_Integer_16(100)		
213	Lookable Integer_16 - 101	int_16	Look_Integer_16(101)		
215	Lookable Integer_16 - 102	int_16	Look_Integer_16(102)		
217	Lookable Integer_16 - 103	int_16	Look_Integer_16(103)		
219	Lookable Integer_16 - 104	int_16	Look_Integer_16(104)		
221	Lookable Integer_16 - 105	int_16	Look_Integer_16(105)		
223	Lookable Integer_16 - 106	int_16	Look_Integer_16(106)		
225	Lookable Integer_16 - 107	int_16	Look_Integer_16(107)		
227	Lookable Integer_16 - 108	int_16	Look_Integer_16(108)		
229	Lookable Integer_16 - 109	int_16	Look_Integer_16(109)		
231	Lookable Integer_16 - 110	int_16	Look_Integer_16(110)		
233	Lookable Integer_16 - 111	int_16	Look_Integer_16(111)		
235	Lookable Integer_16 - 112	int_16	Look_Integer_16(112)		
237	Lookable Integer_16 - 113	int_16	Look_Integer_16(113)		
239	Lookable Integer_16 - 114	int_16	Look_Integer_16(114)		
241	Lookable Integer_16 - 115	int_16	Look_Integer_16(115)		
243	Lookable Integer_16 - 116	int_16	Look_Integer_16(116)		
245	Lookable Integer_16 - 117	int_16	Look_Integer_16(117)		
247	Lookable Integer_16 - 118	int_16	Look_Integer_16(118)		
249	Lookable Integer_16 - 119	int_16	Look_Integer_16(119)		
251	Lookable Integer_16 - 120	int_16	Look_Integer_16(120)		
253	Lookable Integer_16 - 121	int_16	Look_Integer_16(121)		
255	Lookable Integer_16 - 122	int_16	Look_Integer_16(122)		
257	Lookable Integer_16 - 123	int_16	Look_Integer_16(123)		
259	Lookable Integer_16 - 124	int_16	Look_Integer_16(124)		
261	Lookable Integer_16 - 125	int_16	Look_Integer_16(125)		
263	Lookable Integer_16 - 126	int_16	Look_Integer_16(126)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
265	Lookable Integer_16 - 127	int_16	Look_Integer_16(127)		
267	Lookable Integer_16 - 128	int_16	Look_Integer_16(128)		
269	Lookable Integer_16 - 129	int_16	Look_Integer_16(129)		
271	Lookable Integer_16 - 130	int_16	Look_Integer_16(130)		
273	Lookable Integer_16 - 131	int_16	Look_Integer_16(131)		
275	Lookable Integer_16 - 132	int_16	Look_Integer_16(132)		
277	Lookable Integer_16 - 133	int_16	Look_Integer_16(133)		
279	Lookable Integer_16 - 134	int_16	Look_Integer_16(134)		
281	Lookable Integer_16 - 135	int_16	Look_Integer_16(135)		
283	Lookable Integer_16 - 136	int_16	Look_Integer_16(136)		
285	Lookable Integer_16 - 137	int_16	Look_Integer_16(137)		
287	Lookable Integer_16 - 138	int_16	Look_Integer_16(138)		
289	Lookable Integer_16 - 139	int_16	Look_Integer_16(139)		
291	Lookable Integer_16 - 140	int_16	Look_Integer_16(140)		
293	Lookable Integer_16 - 141	int_16	Look_Integer_16(141)		
295	Lookable Integer_16 - 142	int_16	Look_Integer_16(142)		
297	Lookable Integer_16 - 143	int_16	Look_Integer_16(143)		
299	Lookable Integer_16 - 144	int_16	Look_Integer_16(144)		
301	Lookable Integer_16 - 145	int_16	Look_Integer_16(145)		
303	Lookable Integer_16 - 146	int_16	Look_Integer_16(146)		
305	Lookable Integer_16 - 147	int_16	Look_Integer_16(147)		
307	Lookable Integer_16 - 148	int_16	Look_Integer_16(148)		
309	Lookable Integer_16 - 149	int_16	Look_Integer_16(149)		
311	Lookable Integer_16 - 150	int_16	Look_Integer_16(150)		
313	Lookable Integer_16 - 151	int_16	Look_Integer_16(151)		
315	Lookable Integer_16 - 152	int_16	Look_Integer_16(152)		
317	Lookable Integer_16 - 153	int_16	Look_Integer_16(153)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
319	Lookable Integer_16 - 154	int_16	Look_Integer_16(154)		
321	Lookable Integer_16 - 155	int_16	Look_Integer_16(155)		
323	Lookable Integer_16 - 156	int_16	Look_Integer_16(156)		
325	Lookable Integer_16 - 157	int_16	Look_Integer_16(157)		
327	Lookable Integer_16 - 158	int_16	Look_Integer_16(158)		
329	Lookable Integer_16 - 159	int_16	Look_Integer_16(159)		
331	Lookable Integer_16 - 160	int_16	Look_Integer_16(160)		
333	Lookable Integer_16 - 161	int_16	Look_Integer_16(161)		
335	Lookable Integer_16 - 162	int_16	Look_Integer_16(162)		
337	Lookable Integer_16 - 163	int_16	Look_Integer_16(163)		
339	Lookable Integer_16 - 164	int_16	Look_Integer_16(164)		
341	Lookable Integer_16 - 165	int_16	Look_Integer_16(165)		
343	Lookable Integer_16 - 166	int_16	Look_Integer_16(166)		
345	Lookable Integer_16 - 167	int_16	Look_Integer_16(167)		
347	Lookable Integer_16 - 168	int_16	Look_Integer_16(168)		
349	Lookable Integer_16 - 169	int_16	Look_Integer_16(169)		
351	Lookable Integer_16 - 170	int_16	Look_Integer_16(170)		
353	Lookable Integer_16 - 171	int_16	Look_Integer_16(171)		
355	Lookable Integer_16 - 172	int_16	Look_Integer_16(172)		
357	Lookable Integer_16 - 173	int_16	Look_Integer_16(173)		
359	Lookable Integer_16 - 174	int_16	Look_Integer_16(174)		
361	Lookable Integer_16 - 175	int_16	Look_Integer_16(175)		
363	Lookable Integer_16 - 176	int_16	Look_Integer_16(176)		
365	Lookable Integer_16 - 177	int_16	Look_Integer_16(177)		
367	Lookable Integer_16 - 178	int_16	Look_Integer_16(178)		
369	Lookable Integer_16 - 179	int_16	Look_Integer_16(179)		
371	Lookable Integer_16 - 180	int_16	Look_Integer_16(180)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
373	Lookable Integer_16 - 181	int_16	Look_Integer_16(181)		
375	Lookable Integer_16 - 182	int_16	Look_Integer_16(182)		
377	Lookable Integer_16 - 183	int_16	Look_Integer_16(183)		
379	Lookable Integer_16 - 184	int_16	Look_Integer_16(184)		
381	Lookable Integer_16 - 185	int_16	Look_Integer_16(185)		
383	Lookable Integer_16 - 186	int_16	Look_Integer_16(186)		
385	Lookable Integer_16 - 187	int_16	Look_Integer_16(187)		
387	Lookable Integer_16 - 188	int_16	Look_Integer_16(188)		
389	Lookable Integer_16 - 189	int_16	Look_Integer_16(189)		
391	Lookable Integer_16 - 190	int_16	Look_Integer_16(190)		
393	Lookable Integer_16 - 191	int_16	Look_Integer_16(191)		
395	Lookable Integer_16 - 192	int_16	Look_Integer_16(192)		
397	Lookable Integer_16 - 193	int_16	Look_Integer_16(193)		
399	Lookable Integer_16 - 194	int_16	Look_Integer_16(194)		
401	Lookable Integer_16 - 195	int_16	Look_Integer_16(195)		
403	Lookable Integer_16 - 196	int_16	Look_Integer_16(196)		
405	Lookable Integer_16 - 197	int_16	Look_Integer_16(197)		
407	Lookable Integer_16 - 198	int_16	Look_Integer_16(198)		
409	Lookable Integer_16 - 199	int_16	Look_Integer_16(199)		
411	Lookable Integer_16 - 200	int_16	Look_Integer_16(200)		
413	Lookable Integer_8 - 1	int_8	Look_Integer_8(1)		
414	Lookable Integer_8 - 2	int_8	Look_Integer_8(2)		
415	Lookable Integer_8 - 3	int_8	Look_Integer_8(3)		
416	Lookable Integer_8 - 4	int_8	Look_Integer_8(4)		
417	Lookable Integer_8 - 5	int_8	Look_Integer_8(5)		
418	Lookable Integer_8 - 6	int_8	Look_Integer_8(6)		
419	Lookable Integer_8 - 7	int_8	Look_Integer_8(7)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
420	Lookable Integer_8 - 8	int_8	Look_Integer_8(8)		
421	Lookable Integer_8 - 9	int_8	Look_Integer_8(9)		
422	Lookable Integer_8 - 10	int_8	Look_Integer_8(10)		
423	Lookable Integer_8 - 11	int_8	Look_Integer_8(11)		
424	Lookable Integer_8 - 12	int_8	Look_Integer_8(12)		
425	Lookable Integer_8 - 13	int_8	Look_Integer_8(13)		
426	Lookable Integer_8 - 14	int_8	Look_Integer_8(14)		
427	Lookable Integer_8 - 15	int_8	Look_Integer_8(15)		
428	Lookable Integer_8 - 16	int_8	Look_Integer_8(16)		
429	Lookable Integer_8 - 17	int_8	Look_Integer_8(17)		
430	Lookable Integer_8 - 18	int_8	Look_Integer_8(18)		
431	Lookable Integer_8 - 19	int_8	Look_Integer_8(19)		
432	Lookable Integer_8 - 20	int_8	Look_Integer_8(20)		
433	Lookable Integer_8 - 21	int_8	Look_Integer_8(21)		
434	Lookable Integer_8 - 22	int_8	Look_Integer_8(22)		
435	Lookable Integer_8 - 23	int_8	Look_Integer_8(23)		
436	Lookable Integer_8 - 24	int_8	Look_Integer_8(24)		
437	Lookable Integer_8 - 25	int_8	Look_Integer_8(25)		
438	Lookable Integer_8 - 26	int_8	Look_Integer_8(26)		
439	Lookable Integer_8 - 27	int_8	Look_Integer_8(27)		
440	Lookable Integer_8 - 28	int_8	Look_Integer_8(28)		
441	Lookable Integer_8 - 29	int_8	Look_Integer_8(29)		
442	Lookable Integer_8 - 30	int_8	Look_Integer_8(30)		
443	Lookable Integer_8 - 31	int_8	Look_Integer_8(31)		
444	Lookable Integer_8 - 32	int_8	Look_Integer_8(32)		
445	Lookable Integer_8 - 33	int_8	Look_Integer_8(33)		
446	Lookable Integer_8 - 34	int_8	Look_Integer_8(34)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
447	Lookable Integer_8 - 35	int_8	Look_Integer_8(35)		
448	Lookable Integer_8 - 36	int_8	Look_Integer_8(36)		
449	Lookable Integer_8 - 37	int_8	Look_Integer_8(37)		
450	Lookable Integer_8 - 38	int_8	Look_Integer_8(38)		
451	Lookable Integer_8 - 39	int_8	Look_Integer_8(39)		
452	Lookable Integer_8 - 40	int_8	Look_Integer_8(40)		
453	Lookable Integer_8 - 41	int_8	Look_Integer_8(41)		
454	Lookable Integer_8 - 42	int_8	Look_Integer_8(42)		
455	Lookable Integer_8 - 43	int_8	Look_Integer_8(43)		
456	Lookable Integer_8 - 44	int_8	Look_Integer_8(44)		
457	Lookable Integer_8 - 45	int_8	Look_Integer_8(45)		
458	Lookable Integer_8 - 46	int_8	Look_Integer_8(46)		
459	Lookable Integer_8 - 47	int_8	Look_Integer_8(47)		
460	Lookable Integer_8 - 48	int_8	Look_Integer_8(48)		
461	Lookable Integer_8 - 49	int_8	Look_Integer_8(49)		
462	Lookable Integer_8 - 50	int_8	Look_Integer_8(50)		
463	Lookable Boolean - 1	boolean	Look_Boolean(1)		
464	Lookable Boolean - 2	boolean	Look_Boolean(2)		
465	Lookable Boolean - 3	boolean	Look_Boolean(3)		
466	Lookable Boolean - 4	boolean	Look_Boolean(4)		
467	Lookable Boolean - 5	boolean	Look_Boolean(5)		
468	Lookable Boolean - 6	boolean	Look_Boolean(6)		
469	Lookable Boolean - 7	boolean	Look_Boolean(7)		
470	Lookable Boolean - 8	boolean	Look_Boolean(8)		
471	Lookable Boolean - 9	boolean	Look_Boolean(9)		
472	Lookable Boolean - 10	boolean	Look_Boolean(10)		
473	Lookable Boolean - 11	boolean	Look_Boolean(11)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
474	Lookable Boolean - 12	boolean	Look_Boolean(12)		
475	Lookable Boolean - 13	boolean	Look_Boolean(13)		
476	Lookable Boolean - 14	boolean	Look_Boolean(14)		
477	Lookable Boolean - 15	boolean	Look_Boolean(15)		
478	Lookable Boolean - 16	boolean	Look_Boolean(16)		
479	Lookable Boolean - 17	boolean	Look_Boolean(17)		
480	Lookable Boolean - 18	boolean	Look_Boolean(18)		
481	Lookable Boolean - 19	boolean	Look_Boolean(19)		
482	Lookable Boolean - 20	boolean	Look_Boolean(20)		
483	Lookable Boolean - 21	boolean	Look_Boolean(21)		
484	Lookable Boolean - 22	boolean	Look_Boolean(22)		
485	Lookable Boolean - 23	boolean	Look_Boolean(23)		
486	Lookable Boolean - 24	boolean	Look_Boolean(24)		
487	Lookable Boolean - 25	boolean	Look_Boolean(25)		
488	Lookable Boolean - 26	boolean	Look_Boolean(26)		
489	Lookable Boolean - 27	boolean	Look_Boolean(27)		
490	Lookable Boolean - 28	boolean	Look_Boolean(28)		
491	Lookable Boolean - 29	boolean	Look_Boolean(29)		
492	Lookable Boolean - 30	boolean	Look_Boolean(30)		
493	Lookable Boolean - 31	boolean	Look_Boolean(31)		
494	Lookable Boolean - 32	boolean	Look_Boolean(32)		
495	Lookable Boolean - 33	boolean	Look_Boolean(33)		
496	Lookable Boolean - 34	boolean	Look_Boolean(34)		
497	Lookable Boolean - 35	boolean	Look_Boolean(35)		
498	Lookable Boolean - 36	boolean	Look_Boolean(36)		
499	Lookable Boolean - 37	boolean	Look_Boolean(37)		
500	Lookable Boolean - 38	boolean	Look_Boolean(38)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
501	Lookable Boolean - 39	boolean	Look_Boolean(39)		
502	Lookable Boolean - 40	boolean	Look_Boolean(40)		
503	Lookable Boolean - 41	boolean	Look_Boolean(41)		
504	Lookable Boolean - 42	boolean	Look_Boolean(42)		
505	Lookable Boolean - 43	boolean	Look_Boolean(43)		
506	Lookable Boolean - 44	boolean	Look_Boolean(44)		
507	Lookable Boolean - 45	boolean	Look_Boolean(45)		
508	Lookable Boolean - 46	boolean	Look_Boolean(46)		
509	Lookable Boolean - 47	boolean	Look_Boolean(47)		
510	Lookable Boolean - 48	boolean	Look_Boolean(48)		
511	Lookable Boolean - 49	boolean	Look_Boolean(49)		Reserved – Fire Indicator: 0 = no fire in rack; 1 = fire in rack
512	Lookable Boolean - 50	boolean	Look_Boolean(50)		Reserved – Video Output Indicator: 0 = video output not active; 1 = video output active
513	Lookable Group_DI - 1	group_di	Look_Group_DI(1)		
515	Lookable Group_DI - 2	group_di	Look_Group_DI(2)		
517	Lookable Group_DI - 3	group_di	Look_Group_DI(3)		
519	Lookable Group_DI - 4	group_di	Look_Group_DI(4)		
521	Lookable Group_DI - 5	group_di	Look_Group_DI(5)		
523	Lookable Group_DI - 6	group_di	Look_Group_DI(6)		
525	Lookable Group_DI - 7	group_di	Look_Group_DI(7)		
527	Lookable Group_DI - 8	group_di	Look_Group_DI(8)		
529	Lookable Group_DI - 9	group_di	Look_Group_DI(9)		
531	Lookable Group_DI - 10	group_di	Look_Group_DI(10)		
533	Lookable Group_DI - 11	group_di	Look_Group_DI(11)		
535	Lookable Group_DI - 12	group_di	Look_Group_DI(12)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
537	Lookable Group_DI - 13	group_di	Look_Group_DI(13)		
539	Lookable Group_DI - 14	group_di	Look_Group_DI(14)		
541	Lookable Group_DI - 15	group_di	Look_Group_DI(15)		
543	Lookable Group_DI - 16	group_di	Look_Group_DI(16)		
545	Lookable Group_DI - 17	group_di	Look_Group_DI(17)		
547	Lookable Group_DI - 18	group_di	Look_Group_DI(18)		
549	Lookable Group_DI - 19	group_di	Look_Group_DI(19)		
551	Lookable Group_DI - 20	group_di	Look_Group_DI(20)		
553	Lookable Group_DI - 21	group_di	Look_Group_DI(21)		
555	Lookable Group_DI - 22	group_di	Look_Group_DI(22)		
557	Lookable Group_DI - 23	group_di	Look_Group_DI(23)		
559	Lookable Group_DI - 24	group_di	Look_Group_DI(24)		
561	Lookable Group_DI - 25	group_di	Look_Group_DI(25)		
563	Lookable Group_DI - 26	group_di	Look_Group_DI(26)		
565	Lookable Group_DI - 27	group_di	Look_Group_DI(27)		
567	Lookable Group_DI - 28	group_di	Look_Group_DI(28)		
569	Lookable Group_DI - 29	group_di	Look_Group_DI(29)		
571	Lookable Group_DI - 30	group_di	Look_Group_DI(30)		
573	Lookable Group_DI - 31	group_di	Look_Group_DI(31)		
575	Lookable Group_DI - 32	group_di	Look_Group_DI(32)		
577	Lookable Group_DI - 33	group_di	Look_Group_DI(33)		
579	Lookable Group_DI - 34	group_di	Look_Group_DI(34)		
581	Lookable Group_DI - 35	group_di	Look_Group_DI(35)		
583	Lookable Group_DI - 36	group_di	Look_Group_DI(36)		
585	Lookable Group_DI - 37	group_di	Look_Group_DI(37)		
587	Lookable Group_DI - 38	group_di	Look_Group_DI(38)		
589	Lookable Group_DI - 39	group_di	Look_Group_DI(39)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
591	Lookable Group_DI - 40	group_di	Look_Group_DI(40)		
593	Lookable Group_DI - 41	group_di	Look_Group_DI(41)		
595	Lookable Group_DI - 42	group_di	Look_Group_DI(42)		
597	Lookable Group_DI - 43	group_di	Look_Group_DI(43)		
599	Lookable Group_DI - 44	group_di	Look_Group_DI(44)		
601	Lookable Group_DI - 45	group_di	Look_Group_DI(45)		
603	Lookable Group_DI - 46	group_di	Look_Group_DI(46)		
605	Lookable Group_DI - 47	group_di	Look_Group_DI(47)		
607	Lookable Group_DI - 48	group_di	Look_Group_DI(48)		
609	Lookable Group_DI - 49	group_di	Look_Group_DI(49)		
611	Lookable Group_DI - 50	group_di	Look_Group_DI(50)		
613	Lookable Group_DI - 51	group_di	Look_Group_DI(51)		
615	Lookable Group_DI - 52	group_di	Look_Group_DI(52)		
617	Lookable Group_DI - 53	group_di	Look_Group_DI(53)		
619	Lookable Group_DI - 54	group_di	Look_Group_DI(54)		
621	Lookable Group_DI - 55	group_di	Look_Group_DI(55)		
623	Lookable Group_DI - 56	group_di	Look_Group_DI(56)		
625	Lookable Group_DI - 57	group_di	Look_Group_DI(57)		
627	Lookable Group_DI - 58	group_di	Look_Group_DI(58)		
629	Lookable Group_DI - 59	group_di	Look_Group_DI(59)		
631	Lookable Group_DI - 60	group_di	Look_Group_DI(60)		
633	Lookable Group_DI - 61	group_di	Look_Group_DI(61)		
635	Lookable Group_DI - 62	group_di	Look_Group_DI(62)		
637	Lookable Group_DI - 63	group_di	Look_Group_DI(63)		
639	Lookable Group_DI - 64	group_di	Look_Group_DI(64)		
641	Lookable Group_DI - 65	group_di	Look_Group_DI(65)		
643	Lookable Group_DI - 66	group_di	Look_Group_DI(66)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
645	Lookable Group_DI - 67	group_di	Look_Group_DI(67)		
647	Lookable Group_DI - 68	group_di	Look_Group_DI(68)		
649	Lookable Group_DI - 69	group_di	Look_Group_DI(69)		
651	Lookable Group_DI - 70	group_di	Look_Group_DI(70)		
653	Lookable Group_DI - 71	group_di	Look_Group_DI(71)		
655	Lookable Group_DI - 72	group_di	Look_Group_DI(72)		
657	Lookable Group_DI - 73	group_di	Look_Group_DI(73)		
659	Lookable Group_DI - 74	group_di	Look_Group_DI(74)		
661	Lookable Group_DI - 75	group_di	Look_Group_DI(75)		
663	Lookable Group_DI - 76	group_di	Look_Group_DI(76)		
665	Lookable Group_DI - 77	group_di	Look_Group_DI(77)		
667	Lookable Group_DI - 78	group_di	Look_Group_DI(78)		
669	Lookable Group_DI - 79	group_di	Look_Group_DI(79)		
671	Lookable Group_DI - 80	group_di	Look_Group_DI(80)		
673	Lookable Group_DI - 81	group_di	Look_Group_DI(81)		
675	Lookable Group_DI - 82	group_di	Look_Group_DI(82)		
677	Lookable Group_DI - 83	group_di	Look_Group_DI(83)		
679	Lookable Group_DI - 84	group_di	Look_Group_DI(84)		
681	Lookable Group_DI - 85	group_di	Look_Group_DI(85)		
683	Lookable Group_DI - 86	group_di	Look_Group_DI(86)		
685	Lookable Group_DI - 87	group_di	Look_Group_DI(87)		
687	Lookable Group_DI - 88	group_di	Look_Group_DI(88)		
689	Lookable Group_DI - 89	group_di	Look_Group_DI(89)		
691	Lookable Group_DI - 90	group_di	Look_Group_DI(90)		
693	Lookable Group_DI - 91	group_di	Look_Group_DI(91)		
695	Lookable Group_DI - 92	group_di	Look_Group_DI(92)		
697	Lookable Group_DI - 93	group_di	Look_Group_DI(93)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
699	Lookable Group_DI - 94	group_di	Look_Group_DI(94)		
701	Lookable Group_DI - 95	group_di	Look_Group_DI(95)		
703	Lookable Group_DI - 96	group_di	Look_Group_DI(96)		
705	Lookable Group_DI - 97	group_di	Look_Group_DI(97)		
707	Lookable Group_DI - 98	group_di	Look_Group_DI(98)		
709	Lookable Group_DI - 99	group_di	Look_Group_DI(99)		
711	Lookable Group_DI - 100	group_di	Look_Group_DI(100)		
713	Lookable Desired_DI - 1	group_di	Look_Desired_DI(1)		
715	Lookable Desired_DI - 2	group_di	Look_Desired_DI(2)		
717	Lookable Desired_DI - 3	group_di	Look_Desired_DI(3)		
719	Lookable Desired_DI - 4	group_di	Look_Desired_DI(4)		
721	Lookable Desired_DI - 5	group_di	Look_Desired_DI(5)		
723	Lookable Desired_DI - 6	group_di	Look_Desired_DI(6)		
725	Lookable Desired_DI - 7	group_di	Look_Desired_DI(7)		
727	Lookable Desired_DI - 8	group_di	Look_Desired_DI(8)		
729	Lookable Desired_DI - 9	group_di	Look_Desired_DI(9)		
731	Lookable Desired_DI - 10	group_di	Look_Desired_DI(10)		
733	Lookable Desired_DI - 11	group_di	Look_Desired_DI(11)		
735	Lookable Desired_DI - 12	group_di	Look_Desired_DI(12)		
737	Lookable Desired_DI - 13	group_di	Look_Desired_DI(13)		
739	Lookable Desired_DI - 14	group_di	Look_Desired_DI(14)		
741	Lookable Desired_DI - 15	group_di	Look_Desired_DI(15)		
743	Lookable Desired_DI - 16	group_di	Look_Desired_DI(16)		
745	Lookable Desired_DI - 17	group_di	Look_Desired_DI(17)		
747	Lookable Desired_DI - 18	group_di	Look_Desired_DI(18)		
749	Lookable Desired_DI - 19	group_di	Look_Desired_DI(19)		
751	Lookable Desired_DI - 20	group_di	Look_Desired_DI(20)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
753	Lookable Desired_DI - 21	group_di	Look_Desired_DI(21)		
755	Lookable Desired_DI - 22	group_di	Look_Desired_DI(22)		
757	Lookable Desired_DI - 23	group_di	Look_Desired_DI(23)		
759	Lookable Desired_DI - 24	group_di	Look_Desired_DI(24)		
761	Lookable Desired_DI - 25	group_di	Look_Desired_DI(25)		
763	Lookable Desired_DI - 26	group_di	Look_Desired_DI(26)		
765	Lookable Desired_DI - 27	group_di	Look_Desired_DI(27)		
767	Lookable Desired_DI - 28	group_di	Look_Desired_DI(28)		
769	Lookable Desired_DI - 29	group_di	Look_Desired_DI(29)		
771	Lookable Desired_DI - 30	group_di	Look_Desired_DI(30)		
773	Lookable Desired_DI - 31	group_di	Look_Desired_DI(31)		
775	Lookable Desired_DI - 32	group_di	Look_Desired_DI(32)		
777	Lookable Desired_DI - 33	group_di	Look_Desired_DI(33)		
779	Lookable Desired_DI - 34	group_di	Look_Desired_DI(34)		
781	Lookable Desired_DI - 35	group_di	Look_Desired_DI(35)		
783	Lookable Desired_DI - 36	group_di	Look_Desired_DI(36)		
785	Lookable Desired_DI - 37	group_di	Look_Desired_DI(37)		
787	Lookable Desired_DI - 38	group_di	Look_Desired_DI(38)		
789	Lookable Desired_DI - 39	group_di	Look_Desired_DI(39)		
791	Lookable Desired_DI - 40	group_di	Look_Desired_DI(40)		
793	Lookable Desired_DI - 41	group_di	Look_Desired_DI(41)		
795	Lookable Desired_DI - 42	group_di	Look_Desired_DI(42)		
797	Lookable Desired_DI - 43	group_di	Look_Desired_DI(43)		
799	Lookable Desired_DI - 44	group_di	Look_Desired_DI(44)		
801	Lookable Desired_DI - 45	group_di	Look_Desired_DI(45)		
803	Lookable Desired_DI - 46	group_di	Look_Desired_DI(46)		
805	Lookable Desired_DI - 47	group_di	Look_Desired_DI(47)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
807	Lookable Desired_DI - 48	group_di	Look_Desired_DI(48)		
809	Lookable Desired_DI - 49	group_di	Look_Desired_DI(49)		
811	Lookable Desired_DI - 50	group_di	Look_Desired_DI(50)		
813	Lookable Desired_DI - 51	group_di	Look_Desired_DI(51)		
815	Lookable Desired_DI - 52	group_di	Look_Desired_DI(52)		
817	Lookable Desired_DI - 53	group_di	Look_Desired_DI(53)		
819	Lookable Desired_DI - 54	group_di	Look_Desired_DI(54)		
821	Lookable Desired_DI - 55	group_di	Look_Desired_DI(55)		
823	Lookable Desired_DI - 56	group_di	Look_Desired_DI(56)		
825	Lookable Desired_DI - 57	group_di	Look_Desired_DI(57)		
827	Lookable Desired_DI - 58	group_di	Look_Desired_DI(58)		
829	Lookable Desired_DI - 59	group_di	Look_Desired_DI(59)		
831	Lookable Desired_DI - 60	group_di	Look_Desired_DI(60)		
833	Lookable Desired_DI - 61	group_di	Look_Desired_DI(61)		
835	Lookable Desired_DI - 62	group_di	Look_Desired_DI(62)		
837	Lookable Desired_DI - 63	group_di	Look_Desired_DI(63)		
839	Lookable Desired_DI - 64	group_di	Look_Desired_DI(64)		
841	Lookable Desired_DI - 65	group_di	Look_Desired_DI(65)		
843	Lookable Desired_DI - 66	group_di	Look_Desired_DI(66)		
845	Lookable Desired_DI - 67	group_di	Look_Desired_DI(67)		
847	Lookable Desired_DI - 68	group_di	Look_Desired_DI(68)		
849	Lookable Desired_DI - 69	group_di	Look_Desired_DI(69)		
851	Lookable Desired_DI - 70	group_di	Look_Desired_DI(70)		
853	Lookable Desired_DI - 71	group_di	Look_Desired_DI(71)		
855	Lookable Desired_DI - 72	group_di	Look_Desired_DI(72)		
857	Lookable Desired_DI - 73	group_di	Look_Desired_DI(73)		
859	Lookable Desired_DI - 74	group_di	Look_Desired_DI(74)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
861	Lookable Desired_DI - 75	group_di	Look_Desired_DI(75)		
863	Lookable Desired_DI - 76	group_di	Look_Desired_DI(76)		
865	Lookable Desired_DI - 77	group_di	Look_Desired_DI(77)		
867	Lookable Desired_DI - 78	group_di	Look_Desired_DI(78)		
869	Lookable Desired_DI - 79	group_di	Look_Desired_DI(79)		
871	Lookable Desired_DI - 80	group_di	Look_Desired_DI(80)		
873	Lookable Desired_DI - 81	group_di	Look_Desired_DI(81)		
875	Lookable Desired_DI - 82	group_di	Look_Desired_DI(82)		
877	Lookable Desired_DI - 83	group_di	Look_Desired_DI(83)		
879	Lookable Desired_DI - 84	group_di	Look_Desired_DI(84)		
881	Lookable Desired_DI - 85	group_di	Look_Desired_DI(85)		
883	Lookable Desired_DI - 86	group_di	Look_Desired_DI(86)		
885	Lookable Desired_DI - 87	group_di	Look_Desired_DI(87)		
887	Lookable Desired_DI - 88	group_di	Look_Desired_DI(88)		
889	Lookable Desired_DI - 89	group_di	Look_Desired_DI(89)		
891	Lookable Desired_DI - 90	group_di	Look_Desired_DI(90)		
893	Lookable Desired_DI - 91	group_di	Look_Desired_DI(91)		
895	Lookable Desired_DI - 92	group_di	Look_Desired_DI(92)		
897	Lookable Desired_DI - 93	group_di	Look_Desired_DI(93)		
899	Lookable Desired_DI - 94	group_di	Look_Desired_DI(94)		
901	Lookable Desired_DI - 95	group_di	Look_Desired_DI(95)		
903	Lookable Desired_DI - 96	group_di	Look_Desired_DI(96)		
905	Lookable Desired_DI - 97	group_di	Look_Desired_DI(97)		
907	Lookable Desired_DI - 98	group_di	Look_Desired_DI(98)		
909	Lookable Desired_DI - 99	group_di	Look_Desired_DI(99)		
911	Lookable Desired_DI - 100	group_di	Look_Desired_DI(100)		
913	Lookable String - 1	string	Look_String(1)		

Table 30.6-VI PTS Data Message Format 5 Layout – Lookable Integer_16, Integer_8, Boolean, Group DI, Desired DI, String

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
953	Lookable String - 2	string	Look_String(2)		
993	Lookable String - 3	string	Look_String(3)		
1033	Lookable String - 4	string	Look_String(4)		
1073	Lookable String - 5	string	Look_String(5)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Fixed value = 1 for CSIOP
3	Destination ID	int_16	none		Unique value for PTS defined by SSTF
5	Message Type	unsigned_8	none		Fixed value = 5 for Poke Data message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 1172
9	Sequence Number	unsigned_16	none		Sequence count maintained by CSIOP
11	Control Field	unsigned_16	none		Format number = 1 for this message
****	** Data parameters**	*1160 bytes	******	******	******
13	Enterable Float - 1	float	Enter_Float(1)		
17	Enterable Float - 2	float	Enter_Float(2)		
21	Enterable Float - 3	float	Enter_Float(3)		
25	Enterable Float - 4	float	Enter_Float(4)		
29	Enterable Float - 5	float	Enter_Float(5)		
33	Enterable Float - 6	float	Enter_Float(6)		
37	Enterable Float - 7	float	Enter_Float(7)		
41	Enterable Float - 8	float	Enter_Float(8)		
45	Enterable Float - 9	float	Enter_Float(9)		
49	Enterable Float - 10	float	Enter_Float(10)		
53	Enterable Float - 11	float	Enter_Float(11)		
57	Enterable Float - 12	float	Enter_Float(12)		
61	Enterable Float - 13	float	Enter_Float(13)		
65	Enterable Float - 14	float	Enter_Float(14)		
69	Enterable Float - 15	float	Enter_Float(15)		
73	Enterable Float - 16	float	Enter_Float(16)		
77	Enterable Float - 17	float	Enter_Float(17)		
81	Enterable Float - 18	float	Enter_Float(18)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Enterable Float - 19	float	Enter_Float(19)		
89	Enterable Float - 20	float	Enter_Float(20)		
93	Enterable Float - 21	float	Enter_Float(21)		
97	Enterable Float - 22	float	Enter_Float(22)		
101	Enterable Float - 23	float	Enter_Float(23)		
105	Enterable Float - 24	float	Enter_Float(24)		
109	Enterable Float - 25	float	Enter_Float(25)		
113	Enterable Float - 26	float	Enter_Float(26)		
117	Enterable Float - 27	float	Enter_Float(27)		
121	Enterable Float - 28	float	Enter_Float(28)		
125	Enterable Float - 29	float	Enter_Float(29)		
129	Enterable Float - 30	float	Enter_Float(30)		
133	Enterable Float - 31	float	Enter_Float(31)		
137	Enterable Float - 32	float	Enter_Float(32)		
141	Enterable Float - 33	float	Enter_Float(33)		
145	Enterable Float - 34	float	Enter_Float(34)		
149	Enterable Float - 35	float	Enter_Float(35)		
153	Enterable Float - 36	float	Enter_Float(36)		
157	Enterable Float - 37	float	Enter_Float(37)		
161	Enterable Float - 38	float	Enter_Float(38)		
165	Enterable Float - 39	float	Enter_Float(39)		
169	Enterable Float - 40	float	Enter_Float(40)		
173	Enterable Float - 41	float	Enter_Float(41)		
177	Enterable Float - 42	float	Enter_Float(42)		
181	Enterable Float - 43	float	Enter_Float(43)		
185	Enterable Float - 44	float	Enter_Float(44)		
189	Enterable Float - 45	float	Enter_Float(45)		

Table 30.6-VII   Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Enterable Float - 46	float	Enter_Float(46)		
197	Enterable Float - 47	float	Enter_Float(47)		
201	Enterable Float - 48	float	Enter_Float(48)		
205	Enterable Float - 49	float	Enter_Float(49)		
209	Enterable Float - 50	float	Enter_Float(50)		
213	Enterable Float - 51	float	Enter_Float(51)		
217	Enterable Float - 52	float	Enter_Float(52)		
221	Enterable Float - 53	float	Enter_Float(53)		
225	Enterable Float - 54	float	Enter_Float(54)		
229	Enterable Float - 55	float	Enter_Float(55)		
233	Enterable Float - 56	float	Enter_Float(56)		
237	Enterable Float - 57	float	Enter_Float(57)		
241	Enterable Float - 58	float	Enter_Float(58)		
245	Enterable Float - 59	float	Enter_Float(59)		
249	Enterable Float - 60	float	Enter_Float(60)		
253	Enterable Float - 61	float	Enter_Float(61)		
257	Enterable Float - 62	float	Enter_Float(62)		
261	Enterable Float - 63	float	Enter_Float(63)		
265	Enterable Float - 64	float	Enter_Float(64)		
269	Enterable Float - 65	float	Enter_Float(65)		
273	Enterable Float - 66	float	Enter_Float(66)		
277	Enterable Float - 67	float	Enter_Float(67)		
281	Enterable Float - 68	float	Enter_Float(68)		
285	Enterable Float - 69	float	Enter_Float(69)		
289	Enterable Float - 70	float	Enter_Float(70)		
293	Enterable Float - 71	float	Enter_Float(71)		
297	Enterable Float - 72	float	Enter_Float(72)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Enterable Float - 73	float	Enter_Float(73)		
305	Enterable Float - 74	float	Enter_Float(74)		
309	Enterable Float - 75	float	Enter_Float(75)		
313	Enterable Float - 76	float	Enter_Float(76)		
317	Enterable Float - 77	float	Enter_Float(77)		
321	Enterable Float - 78	float	Enter_Float(78)		
325	Enterable Float - 79	float	Enter_Float(79)		
329	Enterable Float - 80	float	Enter_Float(80)		
333	Enterable Float - 81	float	Enter_Float(81)		
337	Enterable Float - 82	float	Enter_Float(82)		
341	Enterable Float - 83	float	Enter_Float(83)		
345	Enterable Float - 84	float	Enter_Float(84)		
349	Enterable Float - 85	float	Enter_Float(85)		
353	Enterable Float - 86	float	Enter_Float(86)		
357	Enterable Float - 87	float	Enter_Float(87)		
361	Enterable Float - 88	float	Enter_Float(88)		
365	Enterable Float - 89	float	Enter_Float(89)		
369	Enterable Float - 90	float	Enter_Float(90)		
373	Enterable Float - 91	float	Enter_Float(91)		
377	Enterable Float - 92	float	Enter_Float(92)		
381	Enterable Float - 93	float	Enter_Float(93)		
385	Enterable Float - 94	float	Enter_Float(94)		
389	Enterable Float - 95	float	Enter_Float(95)		
393	Enterable Float - 96	float	Enter_Float(96)		
397	Enterable Float - 97	float	Enter_Float(97)		
401	Enterable Float - 98	float	Enter_Float(98)		
405	Enterable Float - 99	float	Enter_Float(99)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
409	Enterable Float - 100	float	Enter_Float(100)		
413	Enterable Integer_32 - 1	int_32	Enter_Integer_32(1)		
417	Enterable Integer_32 - 2	int_32	Enter_Integer_32(2)		
421	Enterable Integer_32 - 3	int_32	Enter_Integer_32(3)		
425	Enterable Integer_32 - 4	int_32	Enter_Integer_32(4)		
429	Enterable Integer_32 - 5	int_32	Enter_Integer_32(5)		
433	Enterable Integer_32 - 6	int_32	Enter_Integer_32(6)		
437	Enterable Integer_32 - 7	int_32	Enter_Integer_32(7)		
441	Enterable Integer_32 - 8	int_32	Enter_Integer_32(8)		
445	Enterable Integer_32 - 9	int_32	Enter_Integer_32(9)		
449	Enterable Integer_32 - 10	int_32	Enter_Integer_32(10)		
453	Enterable Integer_32 - 11	int_32	Enter_Integer_32(11)		
457	Enterable Integer_32 - 12	int_32	Enter_Integer_32(12)		
461	Enterable Integer_32 - 13	int_32	Enter_Integer_32(13)		
465	Enterable Integer_32 - 14	int_32	Enter_Integer_32(14)		
469	Enterable Integer_32 - 15	int_32	Enter_Integer_32(15)		
473	Enterable Integer_32 - 16	int_32	Enter_Integer_32(16)		
477	Enterable Integer_32 - 17	int_32	Enter_Integer_32(17)		
481	Enterable Integer_32 - 18	int_32	Enter_Integer_32(18)		
485	Enterable Integer_32 - 19	int_32	Enter_Integer_32(19)		
489	Enterable Integer_32 - 20	int_32	Enter_Integer_32(20)		
493	Enterable Integer_32 - 21	int_32	Enter_Integer_32(21)		
497	Enterable Integer_32 - 22	int_32	Enter_Integer_32(22)		
501	Enterable Integer_32 - 23	int_32	Enter_Integer_32(23)		
505	Enterable Integer_32 - 24	int_32	Enter_Integer_32(24)		
509	Enterable Integer_32 - 25	int_32	Enter_Integer_32(25)		
513	Enterable Integer_32 - 26	int_32	Enter_Integer_32(26)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
517	Enterable Integer_32 - 27	int_32	Enter_Integer_32(27)		
521	Enterable Integer_32 - 28	int_32	Enter_Integer_32(28)		
525	Enterable Integer_32 - 29	int_32	Enter_Integer_32(29)		
529	Enterable Integer_32 - 30	int_32	Enter_Integer_32(30)		
533	Enterable Integer_32 - 31	int_32	Enter_Integer_32(31)		
537	Enterable Integer_32 - 32	int_32	Enter_Integer_32(32)		
541	Enterable Integer_32 - 33	int_32	Enter_Integer_32(33)		
545	Enterable Integer_32 - 34	int_32	Enter_Integer_32(34)		
549	Enterable Integer_32 - 35	int_32	Enter_Integer_32(35)		
553	Enterable Integer_32 - 36	int_32	Enter_Integer_32(36)		
557	Enterable Integer_32 - 37	int_32	Enter_Integer_32(37)		
561	Enterable Integer_32 - 38	int_32	Enter_Integer_32(38)		
565	Enterable Integer_32 - 39	int_32	Enter_Integer_32(39)		
569	Enterable Integer_32 - 40	int_32	Enter_Integer_32(40)		
573	Enterable Integer_32 - 41	int_32	Enter_Integer_32(41)		
577	Enterable Integer_32 - 42	int_32	Enter_Integer_32(42)		
581	Enterable Integer_32 - 43	int_32	Enter_Integer_32(43)		
585	Enterable Integer_32 - 44	int_32	Enter_Integer_32(44)		
589	Enterable Integer_32 - 45	int_32	Enter_Integer_32(45)		
593	Enterable Integer_32 - 46	int_32	Enter_Integer_32(46)		
597	Enterable Integer_32 - 47	int_32	Enter_Integer_32(47)		
601	Enterable Integer_32 - 48	int_32	Enter_Integer_32(48)		
605	Enterable Integer_32 - 49	int_32	Enter_Integer_32(49)		
609	Enterable Integer_32 - 50	int_32	Enter_Integer_32(50)		
613	Enterable Integer_16 - 1	int_16	Enter_Integer_16(1)		
615	Enterable Integer_16 - 2	int_16	Enter_Integer_16(2)		
617	Enterable Integer_16 - 3	int_16	Enter_Integer_16(3)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
619	Enterable Integer_16 - 4	int_16	Enter_Integer_16(4)		
621	Enterable Integer_16 - 5	int_16	Enter_Integer_16(5)		
623	Enterable Integer_16 - 6	int_16	Enter_Integer_16(6)		
625	Enterable Integer_16 - 7	int_16	Enter_Integer_16(7)		
627	Enterable Integer_16 - 8	int_16	Enter_Integer_16(8)		
629	Enterable Integer_16 - 9	int_16	Enter_Integer_16(9)		
631	Enterable Integer_16 - 10	int_16	Enter_Integer_16(10)		
633	Enterable Integer_16 - 11	int_16	Enter_Integer_16(11)		
635	Enterable Integer_16 - 12	int_16	Enter_Integer_16(12)		
637	Enterable Integer_16 - 13	int_16	Enter_Integer_16(13)		
639	Enterable Integer_16 - 14	int_16	Enter_Integer_16(14)		
641	Enterable Integer_16 - 15	int_16	Enter_Integer_16(15)		
643	Enterable Integer_16 - 16	int_16	Enter_Integer_16(16)		
645	Enterable Integer_16 - 17	int_16	Enter_Integer_16(17)		
647	Enterable Integer_16 - 18	int_16	Enter_Integer_16(18)		
649	Enterable Integer_16 - 19	int_16	Enter_Integer_16(19)		
651	Enterable Integer_16 - 20	int_16	Enter_Integer_16(20)		
653	Enterable Integer_16 - 21	int_16	Enter_Integer_16(21)		
655	Enterable Integer_16 - 22	int_16	Enter_Integer_16(22)		
657	Enterable Integer_16 - 23	int_16	Enter_Integer_16(23)		
659	Enterable Integer_16 - 24	int_16	Enter_Integer_16(24)		
661	Enterable Integer_16 - 25	int_16	Enter_Integer_16(25)		
663	Enterable Integer_16 - 26	int_16	Enter_Integer_16(26)		
665	Enterable Integer_16 - 27	int_16	Enter_Integer_16(27)		
667	Enterable Integer_16 - 28	int_16	Enter_Integer_16(28)		
669	Enterable Integer_16 - 29	int_16	Enter_Integer_16(29)		
671	Enterable Integer_16 - 30	int_16	Enter_Integer_16(30)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
673	Enterable Integer_16 - 31	int_16	Enter_Integer_16(31)		
675	Enterable Integer_16 - 32	int_16	Enter_Integer_16(32)		
677	Enterable Integer_16 - 33	int_16	Enter_Integer_16(33)		
679	Enterable Integer_16 - 34	int_16	Enter_Integer_16(34)		
681	Enterable Integer_16 - 35	int_16	Enter_Integer_16(35)		
683	Enterable Integer_16 - 36	int_16	Enter_Integer_16(36)		
685	Enterable Integer_16 - 37	int_16	Enter_Integer_16(37)		
687	Enterable Integer_16 - 38	int_16	Enter_Integer_16(38)		
689	Enterable Integer_16 - 39	int_16	Enter_Integer_16(39)		
691	Enterable Integer_16 - 40	int_16	Enter_Integer_16(40)		
693	Enterable Integer_8 - 1	int_8	Enter_Integer_8(1)		
694	Enterable Integer_8 - 2	int_8	Enter_Integer_8(2)		
695	Enterable Integer_8 - 3	int_8	Enter_Integer_8(3)		
696	Enterable Integer_8 - 4	int_8	Enter_Integer_8(4)		
697	Enterable Integer_8 - 5	int_8	Enter_Integer_8(5)		
698	Enterable Integer_8 - 6	int_8	Enter_Integer_8(6)		
699	Enterable Integer_8 - 7	int_8	Enter_Integer_8(7)		
700	Enterable Integer_8 - 8	int_8	Enter_Integer_8(8)		
701	Enterable Integer_8 - 9	int_8	Enter_Integer_8(9)		
702	Enterable Integer_8 - 10	int_8	Enter_Integer_8(10)		
703	Enterable Integer_8 - 11	int_8	Enter_Integer_8(11)		
704	Enterable Integer_8 - 12	int_8	Enter_Integer_8(12)		
705	Enterable Integer_8 - 13	int_8	Enter_Integer_8(13)		
706	Enterable Integer_8 - 14	int_8	Enter_Integer_8(14)		
707	Enterable Integer_8 - 15	int_8	Enter_Integer_8(15)		
708	Enterable Integer_8 - 16	int_8	Enter_Integer_8(16)		
709	Enterable Integer_8 - 17	int_8	Enter_Integer_8(17)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
710	Enterable Integer_8 - 18	int_8	Enter_Integer_8(18)		
711	Enterable Integer_8 - 19	int_8	Enter_Integer_8(19)		
712	Enterable Integer_8 - 20	int_8	Enter_Integer_8(20)		
713	Enterable Integer_8 - 21	int_8	Enter_Integer_8(21)		
714	Enterable Integer_8 - 22	int_8	Enter_Integer_8(22)		
715	Enterable Integer_8 - 23	int_8	Enter_Integer_8(23)		
716	Enterable Integer_8 - 24	int_8	Enter_Integer_8(24)		
717	Enterable Integer_8 - 25	int_8	Enter_Integer_8(25)		
718	Enterable Integer_8 - 26	int_8	Enter_Integer_8(26)		
719	Enterable Integer_8 - 27	int_8	Enter_Integer_8(27)		
720	Enterable Integer_8 - 28	int_8	Enter_Integer_8(28)		
721	Enterable Integer_8 - 29	int_8	Enter_Integer_8(29)		
722	Enterable Integer_8 - 30	int_8	Enter_Integer_8(30)		
723	Enterable Integer_8 - 31	int_8	Enter_Integer_8(31)		
724	Enterable Integer_8 - 32	int_8	Enter_Integer_8(32)		
725	Enterable Integer_8 - 33	int_8	Enter_Integer_8(33)		
726	Enterable Integer_8 - 34	int_8	Enter_Integer_8(34)		
727	Enterable Integer_8 - 35	int_8	Enter_Integer_8(35)		
728	Enterable Integer_8 - 36	int_8	Enter_Integer_8(36)		
729	Enterable Integer_8 - 37	int_8	Enter_Integer_8(37)		
730	Enterable Integer_8 - 38	int_8	Enter_Integer_8(38)		
731	Enterable Integer_8 - 39	int_8	Enter_Integer_8(39)		
732	Enterable Integer_8 - 40	int_8	Enter_Integer_8(40)		Reserved – set to IC number to cause PSE to initialize to specified IC
733	Enterable Boolean - 1	boolean	Enter_Boolean(1)		
734	Enterable Boolean - 2	boolean	Enter_Boolean(2)		
735	Enterable Boolean - 3	boolean	Enter_Boolean(3)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
736	Enterable Boolean - 4	boolean	Enter_Boolean(4)		
737	Enterable Boolean - 5	boolean	Enter_Boolean(5)		
738	Enterable Boolean - 6	boolean	Enter_Boolean(6)		
739	Enterable Boolean - 7	boolean	Enter_Boolean(7)		
740	Enterable Boolean - 8	boolean	Enter_Boolean(8)		
741	Enterable Boolean - 9	boolean	Enter_Boolean(9)		
742	Enterable Boolean - 10	boolean	Enter_Boolean(10)		
743	Enterable Boolean - 11	boolean	Enter_Boolean(11)		
744	Enterable Boolean - 12	boolean	Enter_Boolean(12)		
745	Enterable Boolean - 13	boolean	Enter_Boolean(13)		
746	Enterable Boolean - 14	boolean	Enter_Boolean(14)		
747	Enterable Boolean - 15	boolean	Enter_Boolean(15)		
748	Enterable Boolean - 16	boolean	Enter_Boolean(16)		
749	Enterable Boolean - 17	boolean	Enter_Boolean(17)		
750	Enterable Boolean - 18	boolean	Enter_Boolean(18)		
751	Enterable Boolean - 19	boolean	Enter_Boolean(19)		
752	Enterable Boolean - 20	boolean	Enter_Boolean(20)		
753	Enterable Boolean - 21	boolean	Enter_Boolean(21)		
754	Enterable Boolean - 22	boolean	Enter_Boolean(22)		
755	Enterable Boolean - 23	boolean	Enter_Boolean(23)		
756	Enterable Boolean - 24	boolean	Enter_Boolean(24)		
757	Enterable Boolean - 25	boolean	Enter_Boolean(25)		
758	Enterable Boolean - 26	boolean	Enter_Boolean(26)		
759	Enterable Boolean - 27	boolean	Enter_Boolean(27)		
760	Enterable Boolean - 28	boolean	Enter_Boolean(28)		
761	Enterable Boolean - 29	boolean	Enter_Boolean(29)		
762	Enterable Boolean - 30	boolean	Enter_Boolean(30)		

Table 30.6-VII Poke Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
7363	Enterable Boolean - 31	boolean	Enter_Boolean(31)		
764	Enterable Boolean - 32	boolean	Enter_Boolean(32)		
765	Enterable Boolean - 33	boolean	Enter_Boolean(33)		
766	Enterable Boolean - 34	boolean	Enter_Boolean(34)		
767	Enterable Boolean - 35	boolean	Enter_Boolean(35)		
768	Enterable Boolean - 36	boolean	Enter_Boolean(36)		
769	Enterable Boolean - 37	boolean	Enter_Boolean(37)		
770	Enterable Boolean - 38	boolean	Enter_Boolean(38)		
771	Enterable Boolean - 39	boolean	Enter_Boolean(39)		
772	Enterable Boolean - 40	boolean	Enter_Boolean(40)		
773	Enterable String 1	string	Enter_String(1)		
813	Enterable String 2	string	Enter_String(2)		
853	Enterable String 3	string	Enter_String(3)		
893	Enterable String 4	string	Enter_String(4)		
933	Enterable String 5	string	Enter_String(5)		
973	Enterable String 6	string	Enter_String(6)		
1013	Enterable String 7	string	Enter_String(7)		
1053	Enterable String 8	string	Enter_String(8)		
1093	Enterable String 9	string	Enter_String(9)		
1133	Enterable String 10	string	Enter_String(10)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Unique value for PTS defined by SSTF
3	Destination ID	int_16	none		Fixed value = 1 for CSIOP
5	Message Type	unsigned_8	none		Fixed value = 16, Data Reset message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 1172
9	Sequence Number	unsigned_16	none		Sequence count maintained by PTS
11	Control Field	unsigned_16	none		Format number = 1 for this message
****	** Data parameters**	*1160 bytes	******	******	******
13	Enterable Float - 1	float	Enter_Float(1)		
17	Enterable Float - 2	float	Enter_Float(2)		
21	Enterable Float - 3	float	Enter_Float(3)		
25	Enterable Float - 4	float	Enter_Float(4)		
29	Enterable Float - 5	float	Enter_Float(5)		
33	Enterable Float - 6	float	Enter_Float(6)		
37	Enterable Float - 7	float	Enter_Float(7)		
41	Enterable Float - 8	float	Enter_Float(8)		
45	Enterable Float - 9	float	Enter_Float(9)		
49	Enterable Float - 10	float	Enter_Float(10)		
53	Enterable Float - 11	float	Enter_Float(11)		
57	Enterable Float - 12	float	Enter_Float(12)		
61	Enterable Float - 13	float	Enter_Float(13)		
65	Enterable Float - 14	float	Enter_Float(14)		
69	Enterable Float - 15	float	Enter_Float(15)		
73	Enterable Float - 16	float	Enter_Float(16)		
77	Enterable Float - 17	float	Enter_Float(17)		
81	Enterable Float - 18	float	Enter_Float(18)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Enterable Float - 19	float	Enter_Float(19)		
89	Enterable Float - 20	float	Enter_Float(20)		
93	Enterable Float - 21	float	Enter_Float(21)		
97	Enterable Float - 22	float	Enter_Float(22)		
101	Enterable Float - 23	float	Enter_Float(23)		
105	Enterable Float - 24	float	Enter_Float(24)		
109	Enterable Float - 25	float	Enter_Float(25)		
113	Enterable Float - 26	float	Enter_Float(26)		
117	Enterable Float - 27	float	Enter_Float(27)		
121	Enterable Float - 28	float	Enter_Float(28)		
125	Enterable Float - 29	float	Enter_Float(29)		
129	Enterable Float - 30	float	Enter_Float(30)		
133	Enterable Float - 31	float	Enter_Float(31)		
137	Enterable Float - 32	float	Enter_Float(32)		
141	Enterable Float - 33	float	Enter_Float(33)		
145	Enterable Float - 34	float	Enter_Float(34)		
149	Enterable Float - 35	float	Enter_Float(35)		
153	Enterable Float - 36	float	Enter_Float(36)		
157	Enterable Float - 37	float	Enter_Float(37)		
161	Enterable Float - 38	float	Enter_Float(38)		
165	Enterable Float - 39	float	Enter_Float(39)		
169	Enterable Float - 40	float	Enter_Float(40)		
173	Enterable Float - 41	float	Enter_Float(41)		
177	Enterable Float - 42	float	Enter_Float(42)		
181	Enterable Float - 43	float	Enter_Float(43)		
185	Enterable Float - 44	float	Enter_Float(44)		
189	Enterable Float - 45	float	Enter_Float(45)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Enterable Float - 46	float	Enter_Float(46)		
197	Enterable Float - 47	float	Enter_Float(47)		
201	Enterable Float - 48	float	Enter_Float(48)		
205	Enterable Float - 49	float	Enter_Float(49)		
209	Enterable Float - 50	float	Enter_Float(50)		
213	Enterable Float - 51	float	Enter_Float(51)		
217	Enterable Float - 52	float	Enter_Float(52)		
221	Enterable Float - 53	float	Enter_Float(53)		
225	Enterable Float - 54	float	Enter_Float(54)		
229	Enterable Float - 55	float	Enter_Float(55)		
233	Enterable Float - 56	float	Enter_Float(56)		
237	Enterable Float - 57	float	Enter_Float(57)		
241	Enterable Float - 58	float	Enter_Float(58)		
245	Enterable Float - 59	float	Enter_Float(59)		
249	Enterable Float - 60	float	Enter_Float(60)		
253	Enterable Float - 61	float	Enter_Float(61)		
257	Enterable Float - 62	float	Enter_Float(62)		
261	Enterable Float - 63	float	Enter_Float(63)		
265	Enterable Float - 64	float	Enter_Float(64)		
269	Enterable Float - 65	float	Enter_Float(65)		
273	Enterable Float - 66	float	Enter_Float(66)		
277	Enterable Float - 67	float	Enter_Float(67)		
281	Enterable Float - 68	float	Enter_Float(68)		
285	Enterable Float - 69	float	Enter_Float(69)		
289	Enterable Float - 70	float	Enter_Float(70)		
293	Enterable Float - 71	float	Enter_Float(71)		
297	Enterable Float - 72	float	Enter_Float(72)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Enterable Float - 73	float	Enter_Float(73)		
305	Enterable Float - 74	float	Enter_Float(74)		
309	Enterable Float - 75	float	Enter_Float(75)		
313	Enterable Float - 76	float	Enter_Float(76)		
317	Enterable Float - 77	float	Enter_Float(77)		
321	Enterable Float - 78	float	Enter_Float(78)		
325	Enterable Float - 79	float	Enter_Float(79)		
329	Enterable Float - 80	float	Enter_Float(80)		
333	Enterable Float - 81	float	Enter_Float(81)		
337	Enterable Float - 82	float	Enter_Float(82)		
341	Enterable Float - 83	float	Enter_Float(83)		
345	Enterable Float - 84	float	Enter_Float(84)		
349	Enterable Float - 85	float	Enter_Float(85)		
353	Enterable Float - 86	float	Enter_Float(86)		
357	Enterable Float - 87	float	Enter_Float(87)		
361	Enterable Float - 88	float	Enter_Float(88)		
365	Enterable Float - 89	float	Enter_Float(89)		
369	Enterable Float - 90	float	Enter_Float(90)		
373	Enterable Float - 91	float	Enter_Float(91)		
377	Enterable Float - 92	float	Enter_Float(92)		
381	Enterable Float - 93	float	Enter_Float(93)		
385	Enterable Float - 94	float	Enter_Float(94)		
389	Enterable Float - 95	float	Enter_Float(95)		
393	Enterable Float - 96	float	Enter_Float(96)		
397	Enterable Float - 97	float	Enter_Float(97)		
401	Enterable Float - 98	float	Enter_Float(98)		
405	Enterable Float - 99	float	Enter_Float(99)		

Table 30.6-VIII   Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
409	Enterable Float - 100	float	Enter_Float(100)		
413	Enterable Integer_32 - 1	int_32	Enter_Integer_32(1)		
417	Enterable Integer_32 - 2	int_32	Enter_Integer_32(2)		
421	Enterable Integer_32 - 3	int_32	Enter_Integer_32(3)		
425	Enterable Integer_32 - 4	int_32	Enter_Integer_32(4)		
429	Enterable Integer_32 - 5	int_32	Enter_Integer_32(5)		
433	Enterable Integer_32 - 6	int_32	Enter_Integer_32(6)		
437	Enterable Integer_32 - 7	int_32	Enter_Integer_32(7)		
441	Enterable Integer_32 - 8	int_32	Enter_Integer_32(8)		
445	Enterable Integer_32 - 9	int_32	Enter_Integer_32(9)		
449	Enterable Integer_32 - 10	int_32	Enter_Integer_32(10)		
453	Enterable Integer_32 - 11	int_32	Enter_Integer_32(11)		
457	Enterable Integer_32 - 12	int_32	Enter_Integer_32(12)		
461	Enterable Integer_32 - 13	int_32	Enter_Integer_32(13)		
465	Enterable Integer_32 - 14	int_32	Enter_Integer_32(14)		
469	Enterable Integer_32 - 15	int_32	Enter_Integer_32(15)		
473	Enterable Integer_32 - 16	int_32	Enter_Integer_32(16)		
477	Enterable Integer_32 - 17	int_32	Enter_Integer_32(17)		
481	Enterable Integer_32 - 18	int_32	Enter_Integer_32(18)		
485	Enterable Integer_32 - 19	int_32	Enter_Integer_32(19)		
489	Enterable Integer_32 - 20	int_32	Enter_Integer_32(20)		
493	Enterable Integer_32 - 21	int_32	Enter_Integer_32(21)		
497	Enterable Integer_32 - 22	int_32	Enter_Integer_32(22)		
501	Enterable Integer_32 - 23	int_32	Enter_Integer_32(23)		
505	Enterable Integer_32 - 24	int_32	Enter_Integer_32(24)		
509	Enterable Integer_32 - 25	int_32	Enter_Integer_32(25)		
513	Enterable Integer_32 - 26	int_32	Enter_Integer_32(26)		

Table 30.6-VIII   Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
517	Enterable Integer_32 - 27	int_32	Enter_Integer_32(27)		
521	Enterable Integer_32 - 28	int_32	Enter_Integer_32(28)		
525	Enterable Integer_32 - 29	int_32	Enter_Integer_32(29)		
529	Enterable Integer_32 - 30	int_32	Enter_Integer_32(30)		
533	Enterable Integer_32 - 31	int_32	Enter_Integer_32(31)		
537	Enterable Integer_32 - 32	int_32	Enter_Integer_32(32)		
541	Enterable Integer_32 - 33	int_32	Enter_Integer_32(33)		
545	Enterable Integer_32 - 34	int_32	Enter_Integer_32(34)		
549	Enterable Integer_32 - 35	int_32	Enter_Integer_32(35)		
553	Enterable Integer_32 - 36	int_32	Enter_Integer_32(36)		
557	Enterable Integer_32 - 37	int_32	Enter_Integer_32(37)		
561	Enterable Integer_32 - 38	int_32	Enter_Integer_32(38)		
565	Enterable Integer_32 - 39	int_32	Enter_Integer_32(39)		
569	Enterable Integer_32 - 40	int_32	Enter_Integer_32(40)		
573	Enterable Integer_32 - 41	int_32	Enter_Integer_32(41)		
577	Enterable Integer_32 - 42	int_32	Enter_Integer_32(42)		
581	Enterable Integer_32 - 43	int_32	Enter_Integer_32(43)		
585	Enterable Integer_32 - 44	int_32	Enter_Integer_32(44)		
589	Enterable Integer_32 - 45	int_32	Enter_Integer_32(45)		
593	Enterable Integer_32 - 46	int_32	Enter_Integer_32(46)		
597	Enterable Integer_32 - 47	int_32	Enter_Integer_32(47)		
601	Enterable Integer_32 - 48	int_32	Enter_Integer_32(48)		
605	Enterable Integer_32 - 49	int_32	Enter_Integer_32(49)		
609	Enterable Integer_32 - 50	int_32	Enter_Integer_32(50)		
613	Enterable Integer_16 - 1	int_16	Enter_Integer_16(1)		
615	Enterable Integer_16 - 2	int_16	Enter_Integer_16(2)		
617	Enterable Integer_16 - 3	int_16	Enter_Integer_16(3)		

Table 30.6-VIII   Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
619	Enterable Integer_16 - 4	int_16	Enter_Integer_16(4)		
621	Enterable Integer_16 - 5	int_16	Enter_Integer_16(5)		
623	Enterable Integer_16 - 6	int_16	Enter_Integer_16(6)		
625	Enterable Integer_16 - 7	int_16	Enter_Integer_16(7)		
627	Enterable Integer_16 - 8	int_16	Enter_Integer_16(8)		
629	Enterable Integer_16 - 9	int_16	Enter_Integer_16(9)		
631	Enterable Integer_16 - 10	int_16	Enter_Integer_16(10)		
633	Enterable Integer_16 - 11	int_16	Enter_Integer_16(11)		
635	Enterable Integer_16 - 12	int_16	Enter_Integer_16(12)		
637	Enterable Integer_16 - 13	int_16	Enter_Integer_16(13)		
639	Enterable Integer_16 - 14	int_16	Enter_Integer_16(14)		
641	Enterable Integer_16 - 15	int_16	Enter_Integer_16(15)		
643	Enterable Integer_16 - 16	int_16	Enter_Integer_16(16)		
645	Enterable Integer_16 - 17	int_16	Enter_Integer_16(17)		
647	Enterable Integer_16 - 18	int_16	Enter_Integer_16(18)		
649	Enterable Integer_16 - 19	int_16	Enter_Integer_16(19)		
651	Enterable Integer_16 - 20	int_16	Enter_Integer_16(20)		
653	Enterable Integer_16 - 21	int_16	Enter_Integer_16(21)		
655	Enterable Integer_16 - 22	int_16	Enter_Integer_16(22)		
657	Enterable Integer_16 - 23	int_16	Enter_Integer_16(23)		
659	Enterable Integer_16 - 24	int_16	Enter_Integer_16(24)		
661	Enterable Integer_16 - 25	int_16	Enter_Integer_16(25)		
663	Enterable Integer_16 - 26	int_16	Enter_Integer_16(26)		
665	Enterable Integer_16 - 27	int_16	Enter_Integer_16(27)		
667	Enterable Integer_16 - 28	int_16	Enter_Integer_16(28)		
669	Enterable Integer_16 - 29	int_16	Enter_Integer_16(29)		
671	Enterable Integer_16 - 30	int_16	Enter_Integer_16(30)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
673	Enterable Integer_16 - 31	int_16	Enter_Integer_16(31)		
675	Enterable Integer_16 - 32	int_16	Enter_Integer_16(32)		
677	Enterable Integer_16 - 33	int_16	Enter_Integer_16(33)		
679	Enterable Integer_16 - 34	int_16	Enter_Integer_16(34)		
681	Enterable Integer_16 - 35	int_16	Enter_Integer_16(35)		
683	Enterable Integer_16 - 36	int_16	Enter_Integer_16(36)		
685	Enterable Integer_16 - 37	int_16	Enter_Integer_16(37)		
687	Enterable Integer_16 - 38	int_16	Enter_Integer_16(38)		
689	Enterable Integer_16 - 39	int_16	Enter_Integer_16(39)		
691	Enterable Integer_16 - 40	int_16	Enter_Integer_16(40)		
693	Enterable Integer_8 - 1	int_8	Enter_Integer_8(1)		
694	Enterable Integer_8 - 2	int_8	Enter_Integer_8(2)		
695	Enterable Integer_8 - 3	int_8	Enter_Integer_8(3)		
696	Enterable Integer_8 - 4	int_8	Enter_Integer_8(4)		
697	Enterable Integer_8 - 5	int_8	Enter_Integer_8(5)		
698	Enterable Integer_8 - 6	int_8	Enter_Integer_8(6)		
699	Enterable Integer_8 - 7	int_8	Enter_Integer_8(7)		
700	Enterable Integer_8 - 8	int_8	Enter_Integer_8(8)		
701	Enterable Integer_8 - 9	int_8	Enter_Integer_8(9)		
702	Enterable Integer_8 - 10	int_8	Enter_Integer_8(10)		
703	Enterable Integer_8 - 11	int_8	Enter_Integer_8(11)		
704	Enterable Integer_8 - 12	int_8	Enter_Integer_8(12)		
705	Enterable Integer_8 - 13	int_8	Enter_Integer_8(13)		
706	Enterable Integer_8 - 14	int_8	Enter_Integer_8(14)		
707	Enterable Integer_8 - 15	int_8	Enter_Integer_8(15)		
708	Enterable Integer_8 - 16	int_8	Enter_Integer_8(16)		
709	Enterable Integer_8 - 17	int_8	Enter_Integer_8(17)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
710	Enterable Integer_8 - 18	int_8	Enter_Integer_8(18)		
711	Enterable Integer_8 - 19	int_8	Enter_Integer_8(19)		
712	Enterable Integer_8 - 20	int_8	Enter_Integer_8(20)		
713	Enterable Integer_8 - 21	int_8	Enter_Integer_8(21)		
714	Enterable Integer_8 - 22	int_8	Enter_Integer_8(22)		
715	Enterable Integer_8 - 23	int_8	Enter_Integer_8(23)		
716	Enterable Integer_8 - 24	int_8	Enter_Integer_8(24)		
717	Enterable Integer_8 - 25	int_8	Enter_Integer_8(25)		
718	Enterable Integer_8 - 26	int_8	Enter_Integer_8(26)		
719	Enterable Integer_8 - 27	int_8	Enter_Integer_8(27)		
720	Enterable Integer_8 - 28	int_8	Enter_Integer_8(28)		
721	Enterable Integer_8 - 29	int_8	Enter_Integer_8(29)		
722	Enterable Integer_8 - 30	int_8	Enter_Integer_8(30)		
723	Enterable Integer_8 - 31	int_8	Enter_Integer_8(31)		
724	Enterable Integer_8 - 32	int_8	Enter_Integer_8(32)		
725	Enterable Integer_8 - 33	int_8	Enter_Integer_8(33)		
726	Enterable Integer_8 - 34	int_8	Enter_Integer_8(34)		
727	Enterable Integer_8 - 35	int_8	Enter_Integer_8(35)		
728	Enterable Integer_8 - 36	int_8	Enter_Integer_8(36)		
729	Enterable Integer_8 - 37	int_8	Enter_Integer_8(37)		
730	Enterable Integer_8 - 38	int_8	Enter_Integer_8(38)		
731	Enterable Integer_8 - 39	int_8	Enter_Integer_8(39)		
732	Enterable Integer_8 - 40	int_8	Enter_Integer_8(40)		
733	Enterable Boolean - 1	boolean	Enter_Boolean(1)		
734	Enterable Boolean - 2	boolean	Enter_Boolean(2)		
735	Enterable Boolean - 3	boolean	Enter_Boolean(3)		
736	Enterable Boolean - 4	boolean	Enter_Boolean(4)		

Table 30.6-VIII   Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
737	Enterable Boolean - 5	boolean	Enter_Boolean(5)		
738	Enterable Boolean - 6	boolean	Enter_Boolean(6)		
739	Enterable Boolean - 7	boolean	Enter_Boolean(7)		
740	Enterable Boolean - 8	boolean	Enter_Boolean(8)		
741	Enterable Boolean - 9	boolean	Enter_Boolean(9)		
742	Enterable Boolean - 10	boolean	Enter_Boolean(10)		
743	Enterable Boolean - 11	boolean	Enter_Boolean(11)		
744	Enterable Boolean - 12	boolean	Enter_Boolean(12)		
745	Enterable Boolean - 13	boolean	Enter_Boolean(13)		
746	Enterable Boolean - 14	boolean	Enter_Boolean(14)		
747	Enterable Boolean - 15	boolean	Enter_Boolean(15)		
748	Enterable Boolean - 16	boolean	Enter_Boolean(16)		
749	Enterable Boolean - 17	boolean	Enter_Boolean(17)		
750	Enterable Boolean - 18	boolean	Enter_Boolean(18)		
751	Enterable Boolean - 19	boolean	Enter_Boolean(19)		
752	Enterable Boolean - 20	boolean	Enter_Boolean(20)		
753	Enterable Boolean - 21	boolean	Enter_Boolean(21)		
754	Enterable Boolean - 22	boolean	Enter_Boolean(22)		
755	Enterable Boolean - 23	boolean	Enter_Boolean(23)		
756	Enterable Boolean - 24	boolean	Enter_Boolean(24)		
757	Enterable Boolean - 25	boolean	Enter_Boolean(25)		
758	Enterable Boolean - 26	boolean	Enter_Boolean(26)		
759	Enterable Boolean - 27	boolean	Enter_Boolean(27)		
760	Enterable Boolean - 28	boolean	Enter_Boolean(28)		
761	Enterable Boolean - 29	boolean	Enter_Boolean(29)		
762	Enterable Boolean - 30	boolean	Enter_Boolean(30)		
7363	Enterable Boolean - 31	boolean	Enter_Boolean(31)		

Table 30.6-VIII Data Reset Message Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
764	Enterable Boolean - 32	boolean	Enter_Boolean(32)		
765	Enterable Boolean - 33	boolean	Enter_Boolean(33)		
766	Enterable Boolean - 34	boolean	Enter_Boolean(34)		
767	Enterable Boolean - 35	boolean	Enter_Boolean(35)		
768	Enterable Boolean - 36	boolean	Enter_Boolean(36)		
769	Enterable Boolean - 37	boolean	Enter_Boolean(37)		
770	Enterable Boolean - 38	boolean	Enter_Boolean(38)		
771	Enterable Boolean - 39	boolean	Enter_Boolean(39)		
772	Enterable Boolean - 40	boolean	Enter_Boolean(40)		
773	Enterable String 1	string	Enter_String(1)		
813	Enterable String 2	string	Enter_String(2)		
853	Enterable String 3	string	Enter_String(3)		
893	Enterable String 4	string	Enter_String(4)		
933	Enterable String 5	string	Enter_String(5)		
973	Enterable String 6	string	Enter_String(6)		
1013	Enterable String 7	string	Enter_String(7)		
1053	Enterable String 8	string	Enter_String(8)		
1093	Enterable String 9	string	Enter_String(9)		
1133	Enterable String 10	string	Enter_String(10)		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Fixed value = 1 for CSIOP
3	Destination ID	int_16	none		Unique value for PTS defined by SSTF
5	Message Type	unsigned_8	none		Fixed value = 4 for Malf Control msg
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 312
9	Sequence Number	unsigned_16	none		Sequence count maintained by CSIOP
11	Control Field	unsigned_16	none		Format number = 1, Simple Malf msg
****	** Data parameters**	**300 bytes	******	******	******
13	Simple Malfunction - 1	boolean	Simple_Malf_1_Ac		
14	Simple Malfunction - 2	boolean	Simple_Malf_2_Ac		
15	Simple Malfunction - 3	boolean	Simple_Malf_3_Ac		
16	Simple Malfunction - 4	boolean	Simple_Malf_4_Ac		
17	Simple Malfunction - 5	boolean	Simple_Malf_5_Ac		
18	Simple Malfunction - 6	boolean	Simple_Malf_6_Ac		
19	Simple Malfunction - 7	boolean	Simple_Malf_7_Ac		
20	Simple Malfunction - 8	boolean	Simple_Malf_8_Ac		
21	Simple Malfunction - 9	boolean	Simple_Malf_9_Ac		
22	Simple Malfunction - 10	boolean	Simple_Malf_10_Ac		
23	Simple Malfunction - 11	boolean	Simple_Malf_11_Ac		
24	Simple Malfunction - 12	boolean	Simple_Malf_12_Ac		
25	Simple Malfunction - 13	boolean	Simple_Malf_13_Ac		
26	Simple Malfunction - 14	boolean	Simple_Malf_14_Ac		
27	Simple Malfunction - 15	boolean	Simple_Malf_15_Ac		
28	Simple Malfunction - 16	boolean	Simple_Malf_16_Ac		
29	Simple Malfunction - 17	boolean	Simple_Malf_17_Ac		
30	Simple Malfunction - 18	boolean	Simple_Malf_18_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
31	Simple Malfunction - 19	boolean	Simple_Malf_19_Ac		
32	Simple Malfunction - 20	boolean	Simple_Malf_20_Ac		
33	Simple Malfunction - 21	boolean	Simple_Malf_21_Ac		
34	Simple Malfunction - 22	boolean	Simple_Malf_22_Ac		
35	Simple Malfunction - 23	boolean	Simple_Malf_23_Ac		
36	Simple Malfunction - 24	boolean	Simple_Malf_24_Ac		
37	Simple Malfunction - 25	boolean	Simple_Malf_25_Ac		
38	Simple Malfunction - 26	boolean	Simple_Malf_26_Ac		
39	Simple Malfunction - 27	boolean	Simple_Malf_27_Ac		
40	Simple Malfunction - 28	boolean	Simple_Malf_28_Ac		
41	Simple Malfunction - 29	boolean	Simple_Malf_29_Ac		
42	Simple Malfunction - 30	boolean	Simple_Malf_30_Ac		
43	Simple Malfunction - 31	boolean	Simple_Malf_31_Ac		
44	Simple Malfunction - 32	boolean	Simple_Malf_32_Ac		
45	Simple Malfunction - 33	boolean	Simple_Malf_33_Ac		
46	Simple Malfunction - 34	boolean	Simple_Malf_34_Ac		
47	Simple Malfunction - 35	boolean	Simple_Malf_35_Ac		
48	Simple Malfunction - 36	boolean	Simple_Malf_36_Ac		
49	Simple Malfunction - 37	boolean	Simple_Malf_37_Ac		
50	Simple Malfunction - 38	boolean	Simple_Malf_38_Ac		
51	Simple Malfunction - 39	boolean	Simple_Malf_39_Ac		
52	Simple Malfunction - 40	boolean	Simple_Malf_40_Ac		
53	Simple Malfunction - 41	boolean	Simple_Malf_41_Ac		
54	Simple Malfunction - 42	boolean	Simple_Malf_42_Ac		
55	Simple Malfunction - 43	boolean	Simple_Malf_43_Ac		
56	Simple Malfunction - 44	boolean	Simple_Malf_44_Ac		
57	Simple Malfunction - 45	boolean	Simple_Malf_45_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
58	Simple Malfunction - 46	boolean	Simple_Malf_46_Ac		
59	Simple Malfunction - 47	boolean	Simple_Malf_47_Ac		
60	Simple Malfunction - 48	boolean	Simple_Malf_48_Ac		
61	Simple Malfunction - 49	boolean	Simple_Malf_49_Ac		
62	Simple Malfunction - 50	boolean	Simple_Malf_50_Ac		
63	Simple Malfunction - 51	boolean	Simple_Malf_51_Ac		
64	Simple Malfunction - 52	boolean	Simple_Malf_52_Ac		
65	Simple Malfunction - 53	boolean	Simple_Malf_53_Ac		
66	Simple Malfunction - 54	boolean	Simple_Malf_54_Ac		
67	Simple Malfunction - 55	boolean	Simple_Malf_55_Ac		
68	Simple Malfunction - 56	boolean	Simple_Malf_56_Ac		
69	Simple Malfunction - 57	boolean	Simple_Malf_57_Ac		
70	Simple Malfunction - 58	boolean	Simple_Malf_58_Ac		
70	Simple Malfunction - 59	boolean	Simple_Malf_59_Ac		
72	Simple Malfunction - 60	boolean	Simple_Malf_60_Ac		
73	Simple Malfunction - 61	boolean	Simple_Malf_61_Ac		
74	Simple Malfunction - 62	boolean	Simple_Malf_62_Ac		
75	Simple Malfunction - 63	boolean	Simple_Malf_63_Ac		
76	Simple Malfunction - 64	boolean	Simple_Malf_64_Ac		
77	Simple Malfunction - 65	boolean	Simple_Malf_65_Ac		
78	Simple Malfunction - 66	boolean	Simple_Malf_66_Ac		
79	Simple Malfunction - 67	boolean	Simple_Malf_67_Ac		
80	Simple Malfunction - 68	boolean	Simple_Malf_68_Ac		
81	Simple Malfunction - 69	boolean	Simple_Malf_69_Ac		
82	Simple Malfunction - 70	boolean	Simple_Malf_70_Ac		
83	Simple Malfunction - 71	boolean	Simple_Malf_71_Ac		
84	Simple Malfunction - 72	boolean	Simple_Malf_72_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
85	Simple Malfunction - 73	boolean	Simple_Malf_73_Ac		
86	Simple Malfunction - 74	boolean	Simple_Malf_74_Ac		
87	Simple Malfunction - 75	boolean	Simple_Malf_75_Ac		
88	Simple Malfunction - 76	boolean	Simple_Malf_76_Ac		
89	Simple Malfunction - 77	boolean	Simple_Malf_77_Ac		
90	Simple Malfunction - 78	boolean	Simple_Malf_78_Ac		
91	Simple Malfunction - 79	boolean	Simple_Malf_79_Ac		
92	Simple Malfunction - 80	boolean	Simple_Malf_80_Ac		
93	Simple Malfunction - 81	boolean	Simple_Malf_81_Ac		
94	Simple Malfunction - 82	boolean	Simple_Malf_82_Ac		
95	Simple Malfunction - 83	boolean	Simple_Malf_83_Ac		
96	Simple Malfunction - 84	boolean	Simple_Malf_84_Ac		
97	Simple Malfunction - 85	boolean	Simple_Malf_85_Ac		
98	Simple Malfunction - 86	boolean	Simple_Malf_86_Ac		
99	Simple Malfunction - 87	boolean	Simple_Malf_87_Ac		
100	Simple Malfunction - 88	boolean	Simple_Malf_88_Ac		
101	Simple Malfunction - 89	boolean	Simple_Malf_89_Ac		
102	Simple Malfunction - 90	boolean	Simple_Malf_90_Ac		
103	Simple Malfunction - 91	boolean	Simple_Malf_91_Ac		
104	Simple Malfunction - 92	boolean	Simple_Malf_92_Ac		
105	Simple Malfunction - 93	boolean	Simple_Malf_93_Ac		
106	Simple Malfunction - 94	boolean	Simple_Malf_94_Ac		
107	Simple Malfunction - 95	boolean	Simple_Malf_95_Ac		
108	Simple Malfunction - 96	boolean	Simple_Malf_96_Ac		
109	Simple Malfunction - 97	boolean	Simple_Malf_97_Ac		
110	Simple Malfunction - 98	boolean	Simple_Malf_98_Ac		
111	Simple Malfunction - 99	boolean	Simple_Malf_99_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
112	Simple Malfunction - 100	boolean	Simple_Malf_100_Ac		
113	Simple Malfunction - 101	boolean	Simple_Malf_101_Ac		
114	Simple Malfunction - 102	boolean	Simple_Malf_102_Ac		
115	Simple Malfunction - 103	boolean	Simple_Malf_103_Ac		
116	Simple Malfunction - 104	boolean	Simple_Malf_104_Ac		
117	Simple Malfunction - 105	boolean	Simple_Malf_105_Ac		
118	Simple Malfunction - 106	boolean	Simple_Malf_106_Ac		
119	Simple Malfunction - 107	boolean	Simple_Malf_107_Ac		
120	Simple Malfunction - 108	boolean	Simple_Malf_108_Ac		
121	Simple Malfunction - 109	boolean	Simple_Malf_109_Ac		
122	Simple Malfunction - 110	boolean	Simple_Malf_110_Ac		
123	Simple Malfunction - 111	boolean	Simple_Malf_111_Ac		
124	Simple Malfunction - 112	boolean	Simple_Malf_112_Ac		
125	Simple Malfunction - 113	boolean	Simple_Malf_113_Ac		
126	Simple Malfunction - 114	boolean	Simple_Malf_114_Ac		
127	Simple Malfunction - 115	boolean	Simple_Malf_115_Ac		
128	Simple Malfunction - 116	boolean	Simple_Malf_116_Ac		
129	Simple Malfunction - 117	boolean	Simple_Malf_117_Ac		
130	Simple Malfunction - 118	boolean	Simple_Malf_118_Ac		
131	Simple Malfunction - 119	boolean	Simple_Malf_119_Ac		
132	Simple Malfunction - 120	boolean	Simple_Malf_120_Ac		
133	Simple Malfunction - 121	boolean	Simple_Malf_121_Ac		
134	Simple Malfunction - 122	boolean	Simple_Malf_122_Ac		
135	Simple Malfunction - 123	boolean	Simple_Malf_123_Ac		
136	Simple Malfunction - 124	boolean	Simple_Malf_124_Ac		
137	Simple Malfunction - 125	boolean	Simple_Malf_125_Ac		
138	Simple Malfunction - 126	boolean	Simple_Malf_126_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
139	Simple Malfunction - 127	boolean	Simple_Malf_127_Ac		
140	Simple Malfunction - 128	boolean	Simple_Malf_128_Ac		
141	Simple Malfunction - 129	boolean	Simple_Malf_129_Ac		
142	Simple Malfunction - 130	boolean	Simple_Malf_130_Ac		
143	Simple Malfunction - 131	boolean	Simple_Malf_131_Ac		
144	Simple Malfunction - 132	boolean	Simple_Malf_132_Ac		
145	Simple Malfunction - 133	boolean	Simple_Malf_133_Ac		
146	Simple Malfunction - 134	boolean	Simple_Malf_134_Ac		
147	Simple Malfunction - 135	boolean	Simple_Malf_135_Ac		
148	Simple Malfunction - 136	boolean	Simple_Malf_136_Ac		
149	Simple Malfunction - 137	boolean	Simple_Malf_137_Ac		
150	Simple Malfunction - 138	boolean	Simple_Malf_138_Ac		
151	Simple Malfunction - 139	boolean	Simple_Malf_139_Ac		
152	Simple Malfunction - 140	boolean	Simple_Malf_140_Ac		
153	Simple Malfunction - 141	boolean	Simple_Malf_141_Ac		
154	Simple Malfunction - 142	boolean	Simple_Malf_142_Ac		
155	Simple Malfunction - 143	boolean	Simple_Malf_143_Ac		
156	Simple Malfunction - 144	boolean	Simple_Malf_144_Ac		
157	Simple Malfunction - 145	boolean	Simple_Malf_145_Ac		
158	Simple Malfunction - 146	boolean	Simple_Malf_146_Ac		
159	Simple Malfunction - 147	boolean	Simple_Malf_147_Ac		
160	Simple Malfunction - 148	boolean	Simple_Malf_148_Ac		
161	Simple Malfunction - 149	boolean	Simple_Malf_149_Ac		
162	Simple Malfunction - 150	boolean	Simple_Malf_150_Ac		
163	Simple Malfunction - 151	boolean	Simple_Malf_151_Ac		
164	Simple Malfunction - 152	boolean	Simple_Malf_152_Ac		
165	Simple Malfunction - 153	boolean	Simple_Malf_153_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
166	Simple Malfunction - 154	boolean	Simple_Malf_154_Ac		
167	Simple Malfunction - 155	boolean	Simple_Malf_155_Ac		
168	Simple Malfunction - 156	boolean	Simple_Malf_156_Ac		
169	Simple Malfunction - 157	boolean	Simple_Malf_157_Ac		
170	Simple Malfunction - 158	boolean	Simple_Malf_158_Ac		
171	Simple Malfunction - 159	boolean	Simple_Malf_159_Ac		
172	Simple Malfunction - 160	boolean	Simple_Malf_160_Ac		
173	Simple Malfunction - 161	boolean	Simple_Malf_161_Ac		
174	Simple Malfunction - 162	boolean	Simple_Malf_162_Ac		
175	Simple Malfunction - 163	boolean	Simple_Malf_163_Ac		
176	Simple Malfunction - 164	boolean	Simple_Malf_164_Ac		
177	Simple Malfunction - 165	boolean	Simple_Malf_165_Ac		
178	Simple Malfunction - 166	boolean	Simple_Malf_166_Ac		
179	Simple Malfunction - 167	boolean	Simple_Malf_167_Ac		
180	Simple Malfunction - 168	boolean	Simple_Malf_168_Ac		
181	Simple Malfunction - 169	boolean	Simple_Malf_169_Ac		
182	Simple Malfunction - 170	boolean	Simple_Malf_170_Ac		
183	Simple Malfunction - 171	boolean	Simple_Malf_171_Ac		
184	Simple Malfunction - 172	boolean	Simple_Malf_172_Ac		
185	Simple Malfunction - 173	boolean	Simple_Malf_173_Ac		
186	Simple Malfunction - 174	boolean	Simple_Malf_174_Ac		
187	Simple Malfunction - 175	boolean	Simple_Malf_175_Ac		
188	Simple Malfunction - 176	boolean	Simple_Malf_176_Ac		
189	Simple Malfunction - 177	boolean	Simple_Malf_177_Ac		
190	Simple Malfunction - 178	boolean	Simple_Malf_178_Ac		
191	Simple Malfunction - 179	boolean	Simple_Malf_179_Ac		
192	Simple Malfunction - 180	boolean	Simple_Malf_180_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	Simple Malfunction - 181	boolean	Simple_Malf_181_Ac		
194	Simple Malfunction - 182	boolean	Simple_Malf_182_Ac		
195	Simple Malfunction - 183	boolean	Simple_Malf_183_Ac		
196	Simple Malfunction - 184	boolean	Simple_Malf_184_Ac		
197	Simple Malfunction - 185	boolean	Simple_Malf_185_Ac		
198	Simple Malfunction - 186	boolean	Simple_Malf_186_Ac		
199	Simple Malfunction - 187	boolean	Simple_Malf_187_Ac		
200	Simple Malfunction - 188	boolean	Simple_Malf_188_Ac		
201	Simple Malfunction - 189	boolean	Simple_Malf_189_Ac		
202	Simple Malfunction - 190	boolean	Simple_Malf_190_Ac		
203	Simple Malfunction - 191	boolean	Simple_Malf_191_Ac		
204	Simple Malfunction - 192	boolean	Simple_Malf_192_Ac		
205	Simple Malfunction - 193	boolean	Simple_Malf_193_Ac		
206	Simple Malfunction - 194	boolean	Simple_Malf_194_Ac		
207	Simple Malfunction - 195	boolean	Simple_Malf_195_Ac		
208	Simple Malfunction - 196	boolean	Simple_Malf_196_Ac		
209	Simple Malfunction - 197	boolean	Simple_Malf_197_Ac		
210	Simple Malfunction - 198	boolean	Simple_Malf_198_Ac		
211	Simple Malfunction - 199	boolean	Simple_Malf_199_Ac		
212	Simple Malfunction - 200	boolean	Simple_Malf_200_Ac		
213	Simple Malfunction - 201	boolean	Simple_Malf_201_Ac		
214	Simple Malfunction - 202	boolean	Simple_Malf_202_Ac		
215	Simple Malfunction - 203	boolean	Simple_Malf_203_Ac		
216	Simple Malfunction - 204	boolean	Simple_Malf_204_Ac		
217	Simple Malfunction - 205	boolean	Simple_Malf_205_Ac		
218	Simple Malfunction - 206	boolean	Simple_Malf_206_Ac		
219	Simple Malfunction - 207	boolean	Simple_Malf_207_Ac		

Table 30.6-IX   Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
220	Simple Malfunction - 208	boolean	Simple_Malf_208_Ac		
221	Simple Malfunction - 209	boolean	Simple_Malf_209_Ac		
222	Simple Malfunction - 210	boolean	Simple_Malf_210_Ac		
223	Simple Malfunction - 211	boolean	Simple_Malf_211_Ac		
224	Simple Malfunction - 212	boolean	Simple_Malf_212_Ac		
225	Simple Malfunction - 213	boolean	Simple_Malf_213_Ac		
226	Simple Malfunction - 214	boolean	Simple_Malf_214_Ac		
227	Simple Malfunction - 215	boolean	Simple_Malf_215_Ac		
228	Simple Malfunction - 216	boolean	Simple_Malf_216_Ac		
229	Simple Malfunction - 217	boolean	Simple_Malf_217_Ac		
230	Simple Malfunction - 218	boolean	Simple_Malf_218_Ac		
231	Simple Malfunction - 219	boolean	Simple_Malf_219_Ac		
232	Simple Malfunction - 220	boolean	Simple_Malf_220_Ac		
233	Simple Malfunction - 221	boolean	Simple_Malf_221_Ac		
234	Simple Malfunction - 222	boolean	Simple_Malf_222_Ac		
235	Simple Malfunction - 223	boolean	Simple_Malf_223_Ac		
236	Simple Malfunction - 224	boolean	Simple_Malf_224_Ac		
237	Simple Malfunction - 225	boolean	Simple_Malf_225_Ac		
238	Simple Malfunction - 226	boolean	Simple_Malf_226_Ac		
239	Simple Malfunction - 227	boolean	Simple_Malf_227_Ac		
240	Simple Malfunction - 228	boolean	Simple_Malf_228_Ac		
241	Simple Malfunction - 229	boolean	Simple_Malf_229_Ac		
242	Simple Malfunction - 230	boolean	Simple_Malf_230_Ac		
243	Simple Malfunction - 231	boolean	Simple_Malf_231_Ac		
244	Simple Malfunction - 232	boolean	Simple_Malf_232_Ac		
245	Simple Malfunction - 233	boolean	Simple_Malf_233_Ac		
246	Simple Malfunction - 234	boolean	Simple_Malf_234_Ac		

Table 30.6-IX   Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
247	Simple Malfunction - 235	boolean	Simple_Malf_235_Ac		
248	Simple Malfunction - 236	boolean	Simple_Malf_236_Ac		
249	Simple Malfunction - 237	boolean	Simple_Malf_237_Ac		
250	Simple Malfunction - 238	boolean	Simple_Malf_238_Ac		
251	Simple Malfunction - 239	boolean	Simple_Malf_239_Ac		
252	Simple Malfunction - 240	boolean	Simple_Malf_240_Ac		
253	Simple Malfunction - 241	boolean	Simple_Malf_241_Ac		
254	Simple Malfunction - 242	boolean	Simple_Malf_242_Ac		
255	Simple Malfunction - 243	boolean	Simple_Malf_243_Ac		
256	Simple Malfunction - 244	boolean	Simple_Malf_244_Ac		
257	Simple Malfunction - 245	boolean	Simple_Malf_245_Ac		
258	Simple Malfunction - 246	boolean	Simple_Malf_246_Ac		
259	Simple Malfunction - 247	boolean	Simple_Malf_247_Ac		
260	Simple Malfunction - 248	boolean	Simple_Malf_248_Ac		
261	Simple Malfunction - 249	boolean	Simple_Malf_249_Ac		
262	Simple Malfunction - 250	boolean	Simple_Malf_250_Ac		
263	Simple Malfunction - 251	boolean	Simple_Malf_251_Ac		
264	Simple Malfunction - 252	boolean	Simple_Malf_252_Ac		
265	Simple Malfunction - 253	boolean	Simple_Malf_253_Ac		
266	Simple Malfunction - 254	boolean	Simple_Malf_254_Ac		
267	Simple Malfunction - 255	boolean	Simple_Malf_255_Ac		
268	Simple Malfunction - 256	boolean	Simple_Malf_256_Ac		
269	Simple Malfunction - 257	boolean	Simple_Malf_257_Ac		
270	Simple Malfunction - 258	boolean	Simple_Malf_258_Ac		
271	Simple Malfunction - 259	boolean	Simple_Malf_259_Ac		
272	Simple Malfunction - 260	boolean	Simple_Malf_260_Ac		
273	Simple Malfunction - 261	boolean	Simple_Malf_261_Ac		

Table 30.6-IX Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
274	Simple Malfunction - 262	boolean	Simple_Malf_262_Ac		
275	Simple Malfunction - 263	boolean	Simple_Malf_263_Ac		
276	Simple Malfunction - 264	boolean	Simple_Malf_264_Ac		
277	Simple Malfunction - 265	boolean	Simple_Malf_265_Ac		
278	Simple Malfunction - 266	boolean	Simple_Malf_266_Ac		
279	Simple Malfunction - 267	boolean	Simple_Malf_267_Ac		
280	Simple Malfunction - 268	boolean	Simple_Malf_268_Ac		
281	Simple Malfunction - 269	boolean	Simple_Malf_269_Ac		
282	Simple Malfunction - 270	boolean	Simple_Malf_270_Ac		
283	Simple Malfunction - 271	boolean	Simple_Malf_271_Ac		
284	Simple Malfunction - 272	boolean	Simple_Malf_272_Ac		
285	Simple Malfunction - 273	boolean	Simple_Malf_273_Ac		
286	Simple Malfunction - 274	boolean	Simple_Malf_274_Ac		
287	Simple Malfunction - 275	boolean	Simple_Malf_275_Ac		
288	Simple Malfunction - 276	boolean	Simple_Malf_276_Ac		
289	Simple Malfunction - 277	boolean	Simple_Malf_277_Ac		
290	Simple Malfunction - 278	boolean	Simple_Malf_278_Ac		
291	Simple Malfunction - 279	boolean	Simple_Malf_279_Ac		
292	Simple Malfunction - 280	boolean	Simple_Malf_280_Ac		
293	Simple Malfunction - 281	boolean	Simple_Malf_281_Ac		
294	Simple Malfunction - 282	boolean	Simple_Malf_282_Ac		
295	Simple Malfunction - 283	boolean	Simple_Malf_283_Ac		
296	Simple Malfunction - 284	boolean	Simple_Malf_284_Ac		
297	Simple Malfunction - 285	boolean	Simple_Malf_285_Ac		
298	Simple Malfunction - 286	boolean	Simple_Malf_286_Ac		
299	Simple Malfunction - 287	boolean	Simple_Malf_287_Ac		
300	Simple Malfunction - 288	boolean	Simple_Malf_288_Ac		

Table 30.6-IX   Malfunction Control Message Format 1 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
301	Simple Malfunction - 289	boolean	Simple_Malf_289_Ac		
302	Simple Malfunction - 290	boolean	Simple_Malf_290_Ac		
303	Simple Malfunction - 291	boolean	Simple_Malf_291_Ac		
304	Simple Malfunction - 292	boolean	Simple_Malf_292_Ac		
305	Simple Malfunction - 293	boolean	Simple_Malf_293_Ac		
306	Simple Malfunction - 294	boolean	Simple_Malf_294_Ac		
307	Simple Malfunction - 295	boolean	Simple_Malf_295_Ac		
308	Simple Malfunction - 296	boolean	Simple_Malf_296_Ac		
309	Simple Malfunction - 297	boolean	Simple_Malf_297_Ac		
310	Simple Malfunction - 298	boolean	Simple_Malf_298_Ac		
311	Simple Malfunction - 299	boolean	Simple_Malf_299_Ac		
312	Simple Malfunction - 300	boolean	Simple_Malf_300_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Fixed value = 1 for CSIOP
3	Destination ID	int_16	none		Unique value for PTS, defined by SSTF
5	Message Type	unsigned_8	none		Fixed value = 4 for Malf Control message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 762
9	Sequence Number	unsigned_16	none		Sequence count maintained by CSIOP
11	Control Field	unsigned_16	none		Format number = 2 for P1 Malf message
****	** Data parameters**	**750 bytes	******	******	******
13	P1 Malfunction 1 Active	boolean	P1_Malf_1_Ac		
14	P1 Malfunction 1 Value	float	P1_Malf_1_P1		
18	P1 Malfunction 2 Active	boolean	P1_Malf_2_Ac		
19	P1 Malfunction 2 Value	float	P1_Malf_2_P1		
23	P1 Malfunction 3 Active	boolean	P1_Malf_3_Ac		
24	P1 Malfunction 3 Value	float	P1_Malf_3_P1		
28	P1 Malfunction 4 Active	boolean	P1_Malf_4_Ac		
29	P1 Malfunction 4 Value	float	P1_Malf_4_P1		
33	P1 Malfunction 5 Active	boolean	P1_Malf_5_Ac		
34	P1 Malfunction 5 Value	float	P1_Malf_5_P1		
38	P1 Malfunction 6 Active	boolean	P1_Malf_6_Ac		
39	P1 Malfunction 6 Value	float	P1_Malf_6_P1		
43	P1 Malfunction 7 Active	boolean	P1_Malf_7_Ac		
44	P1 Malfunction 7 Value	float	P1_Malf_7_P1		
48	P1 Malfunction 8 Active	boolean	P1_Malf_8_Ac		
49	P1 Malfunction 8 Value	float	P1_Malf_8_P1		
53	P1 Malfunction 9 Active	boolean	P1_Malf_9_Ac		
54	P1 Malfunction 9 Value	float	P1_Malf_9_P1		

Table 30.6-X   Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
58	P1 Malfunction 10 Active	boolean	P1_Malf_10_Ac		
59	P1 Malfunction 10 Value	float	P1_Malf_10_P1		
63	P1 Malfunction 11 Active	boolean	P1_Malf_11_Ac		
64	P1 Malfunction 11 Value	float	P1_Malf_11_P1		
68	P1 Malfunction 12 Active	boolean	P1_Malf_12_Ac		
69	P1 Malfunction 12 Value	float	P1_Malf_12_P1		
73	P1 Malfunction 13 Active	boolean	P1_Malf_13_Ac		
74	P1 Malfunction 13 Value	float	P1_Malf_13_P1		
78	P1 Malfunction 14 Active	boolean	P1_Malf_14_Ac		
79	P1 Malfunction 14 Value	float	P1_Malf_14_P1		
83	P1 Malfunction 15 Active	boolean	P1_Malf_15_Ac		
84	P1 Malfunction 15 Value	float	P1_Malf_15_P1		
88	P1 Malfunction 16 Active	boolean	P1_Malf_16_Ac		
89	P1 Malfunction 16 Value	float	P1_Malf_16_P1		
93	P1 Malfunction 17 Active	boolean	P1_Malf_17_Ac		
94	P1 Malfunction 17 Value	float	P1_Malf_17_P1		
98	P1 Malfunction 18 Active	boolean	P1_Malf_18_Ac		
99	P1 Malfunction 18 Value	float	P1_Malf_18_P1		
103	P1 Malfunction 19 Active	boolean	P1_Malf_19_Ac		
104	P1 Malfunction 19 Value	float	P1_Malf_19_P1		
108	P1 Malfunction 20 Active	boolean	P1_Malf_20_Ac		
109	P1 Malfunction 20 Value	float	P1_Malf_20_P1		
113	P1 Malfunction 21 Active	boolean	P1_Malf_21_Ac		
114	P1 Malfunction 21 Value	float	P1_Malf_21_P1		
118	P1 Malfunction 22 Active	boolean	P1_Malf_22_Ac		
119	P1 Malfunction 22 Value	float	P1_Malf_22_P1		
123	P1 Malfunction 23 Active	boolean	P1_Malf_23_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
124	P1 Malfunction 23 Value	float	P1_Malf_23_P1		
128	P1 Malfunction 24 Active	boolean	P1_Malf_24_Ac		
129	P1 Malfunction 24 Value	float	P1_Malf_24_P1		
133	P1 Malfunction 25 Active	boolean	P1_Malf_25_Ac		
134	P1 Malfunction 25 Value	float	P1_Malf_25_P1		
138	P1 Malfunction 26 Active	boolean	P1_Malf_26_Ac		
139	P1 Malfunction 26 Value	float	P1_Malf_26_P1		
143	P1 Malfunction 27 Active	boolean	P1_Malf_27_Ac		
144	P1 Malfunction 27 Value	float	P1_Malf_27_P1		
148	P1 Malfunction 28 Active	boolean	P1_Malf_28_Ac		
149	P1 Malfunction 28 Value	float	P1_Malf_28_P1		
153	P1 Malfunction 29 Active	boolean	P1_Malf_29_Ac		
154	P1 Malfunction 29 Value	float	P1_Malf_29_P1		
158	P1 Malfunction 30 Active	boolean	P1_Malf_30_Ac		
159	P1 Malfunction 30 Value	float	P1_Malf_30_P1		
163	P1 Malfunction 31 Active	boolean	P1_Malf_31_Ac		
164	P1 Malfunction 31 Value	float	P1_Malf_31_P1		
168	P1 Malfunction 32 Active	boolean	P1_Malf_32_Ac		
169	P1 Malfunction 32 Value	float	P1_Malf_32_P1		
173	P1 Malfunction 33 Active	boolean	P1_Malf_33_Ac		
174	P1 Malfunction 33 Value	float	P1_Malf_33_P1		
178	P1 Malfunction 34 Active	boolean	P1_Malf_34_Ac		
179	P1 Malfunction 34 Value	float	P1_Malf_34_P1		
183	P1 Malfunction 35 Active	boolean	P1_Malf_35_Ac		
184	P1 Malfunction 35 Value	float	P1_Malf_35_P1		
188	P1 Malfunction 36 Active	boolean	P1_Malf_36_Ac		
189	P1 Malfunction 36 Value	float	P1_Malf_36_P1		

Table 30.6-X   Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
193	P1 Malfunction 37 Active	boolean	P1_Malf_37_Ac		
194	P1 Malfunction 37 Value	float	P1_Malf_37_P1		
198	P1 Malfunction 38 Active	boolean	P1_Malf_38_Ac		
199	P1 Malfunction 38 Value	float	P1_Malf_38_P1		
203	P1 Malfunction 39 Active	boolean	P1_Malf_39_Ac		
204	P1 Malfunction 39 Value	float	P1_Malf_39_P1		
208	P1 Malfunction 40 Active	boolean	P1_Malf_40_Ac		
209	P1 Malfunction 40 Value	float	P1_Malf_40_P1		
213	P1 Malfunction 41 Active	boolean	P1_Malf_41_Ac		
214	P1 Malfunction 41 Value	float	P1_Malf_41_P1		
218	P1 Malfunction 42 Active	boolean	P1_Malf_42_Ac		
219	P1 Malfunction 42 Value	float	P1_Malf_42_P1		
223	P1 Malfunction 43 Active	boolean	P1_Malf_43_Ac		
224	P1 Malfunction 43 Value	float	P1_Malf_43_P1		
228	P1 Malfunction 44 Active	boolean	P1_Malf_44_Ac		
229	P1 Malfunction 44 Value	float	P1_Malf_44_P1		
233	P1 Malfunction 45 Active	boolean	P1_Malf_45_Ac		
234	P1 Malfunction 45 Value	float	P1_Malf_45_P1		
238	P1 Malfunction 46 Active	boolean	P1_Malf_46_Ac		
239	P1 Malfunction 46 Value	float	P1_Malf_46_P1		
243	P1 Malfunction 47 Active	boolean	P1_Malf_47_Ac		
244	P1 Malfunction 47 Value	float	P1_Malf_47_P1		
248	P1 Malfunction 48 Active	boolean	P1_Malf_48_Ac		
249	P1 Malfunction 48 Value	float	P1_Malf_48_P1		
253	P1 Malfunction 49 Active	boolean	P1_Malf_49_Ac		
254	P1 Malfunction 49 Value	float	P1_Malf_49_P1		
258	P1 Malfunction 50 Active	boolean	P1_Malf_50_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
259	P1 Malfunction 50 Value	float	P1_Malf_50_P1		
263	P1 Malfunction 51 Active	boolean	P1_Malf_51_Ac		
264	P1 Malfunction 51 Value	float	P1_Malf_51_P1		
268	P1 Malfunction 52 Active	boolean	P1_Malf_52_Ac		
269	P1 Malfunction 52 Value	float	P1_Malf_52_P1		
273	P1 Malfunction 53 Active	boolean	P1_Malf_53_Ac		
274	P1 Malfunction 53 Value	float	P1_Malf_53_P1		
278	P1 Malfunction 54 Active	boolean	P1_Malf_54_Ac		
279	P1 Malfunction 54 Value	float	P1_Malf_54_P1		
283	P1 Malfunction 55 Active	boolean	P1_Malf_55_Ac		
284	P1 Malfunction 55 Value	float	P1_Malf_55_P1		
288	P1 Malfunction 56 Active	boolean	P1_Malf_56_Ac		
289	P1 Malfunction 56 Value	float	P1_Malf_56_P1		
293	P1 Malfunction 57 Active	boolean	P1_Malf_57_Ac		
294	P1 Malfunction 57 Value	float	P1_Malf_57_P1		
298	P1 Malfunction 58 Active	boolean	P1_Malf_58_Ac		
299	P1 Malfunction 58 Value	float	P1_Malf_58_P1		
303	P1 Malfunction 59 Active	boolean	P1_Malf_59_Ac		
304	P1 Malfunction 59 Value	float	P1_Malf_59_P1		
308	P1 Malfunction 60 Active	boolean	P1_Malf_60_Ac		
309	P1 Malfunction 60 Value	float	P1_Malf_60_P1		
313	P1 Malfunction 61 Active	boolean	P1_Malf_61_Ac		
314	P1 Malfunction 61 Value	float	P1_Malf_61_P1		
318	P1 Malfunction 62 Active	boolean	P1_Malf_62_Ac		
319	P1 Malfunction 62 Value	float	P1_Malf_62_P1		
323	P1 Malfunction 63 Active	boolean	P1_Malf_63_Ac		
324	P1 Malfunction 63 Value	float	P1_Malf_63_P1		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
328	P1 Malfunction 64 Active	boolean	P1_Malf_64_Ac		
329	P1 Malfunction 64 Value	float	P1_Malf_64_P1		
333	P1 Malfunction 65 Active	boolean	P1_Malf_65_Ac		
334	P1 Malfunction 65 Value	float	P1_Malf_65_P1		
338	P1 Malfunction 66 Value	float	P1_Malf_66_P1		
339	P1 Malfunction 66 Active	boolean	P1_Malf_66_Ac		
343	P1 Malfunction 67 Active	boolean	P1_Malf_67_Ac		
344	P1 Malfunction 67 Value	float	P1_Malf_67_P1		
348	P1 Malfunction 68 Active	boolean	P1_Malf_68_Ac		
349	P1 Malfunction 68 Value	float	P1_Malf_68_P1		
353	P1 Malfunction 69 Active	boolean	P1_Malf_69_Ac		
354	P1 Malfunction 69 Value	float	P1_Malf_69_P1		
358	P1 Malfunction 70 Active	boolean	P1_Malf_70_Ac		
359	P1 Malfunction 70 Value	float	P1_Malf_70_P1		
363	P1 Malfunction 71 Active	boolean	P1_Malf_71_Ac		
364	P1 Malfunction 71 Value	float	P1_Malf_71_P1		
368	P1 Malfunction 72 Active	boolean	P1_Malf_72_Ac		
369	P1 Malfunction 72 Value	float	P1_Malf_72_P1		
373	P1 Malfunction 73 Active	boolean	P1_Malf_73_Ac		
374	P1 Malfunction 73 Value	float	P1_Malf_73_P1		
378	P1 Malfunction 74 Active	boolean	P1_Malf_74_Ac		
379	P1 Malfunction 74 Value	float	P1_Malf_74_P1		
383	P1 Malfunction 75 Active	boolean	P1_Malf_75_Ac		
384	P1 Malfunction 75 Value	float	P1_Malf_75_P1		
388	P1 Malfunction 76 Active	boolean	P1_Malf_76_Ac		
389	P1 Malfunction 76 Value	float	P1_Malf_76_P1		
393	P1 Malfunction 77 Active	boolean	P1_Malf_77_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
394	P1 Malfunction 77 Value	float	P1_Malf_77_P1		
398	P1 Malfunction 78 Active	boolean	P1_Malf_78_Ac		
399	P1 Malfunction 78 Value	float	P1_Malf_78_P1		
403	P1 Malfunction 79 Active	boolean	P1_Malf_79_Ac		
404	P1 Malfunction 79 Value	float	P1_Malf_79_P1		
408	P1 Malfunction 80 Active	boolean	P1_Malf_80_Ac		
409	P1 Malfunction 80 Value	float	P1_Malf_80_P1		
413	P1 Malfunction 81 Active	boolean	P1_Malf_81_Ac		
414	P1 Malfunction 81 Value	float	P1_Malf_81_P1		
418	P1 Malfunction 82 Active	boolean	P1_Malf_82_Ac		
419	P1 Malfunction 82 Value	float	P1_Malf_82_P1		
423	P1 Malfunction 83 Active	boolean	P1_Malf_83_Ac		
424	P1 Malfunction 83 Value	float	P1_Malf_83_P1		
428	P1 Malfunction 84 Active	boolean	P1_Malf_84_Ac		
429	P1 Malfunction 84 Value	float	P1_Malf_84_P1		
433	P1 Malfunction 85 Active	boolean	P1_Malf_85_Ac		
434	P1 Malfunction 85 Value	float	P1_Malf_85_P1		
438	P1 Malfunction 86 Active	boolean	P1_Malf_86_Ac		
439	P1 Malfunction 86 Value	float	P1_Malf_86_P1		
443	P1 Malfunction 87 Active	boolean	P1_Malf_87_Ac		
444	P1 Malfunction 87 Value	float	P1_Malf_87_P1		
448	P1 Malfunction 88 Active	boolean	P1_Malf_88_Ac		
449	P1 Malfunction 88 Value	float	P1_Malf_88_P1		
453	P1 Malfunction 89 Active	boolean	P1_Malf_89_Ac		
454	P1 Malfunction 89 Value	float	P1_Malf_89_P1		
458	P1 Malfunction 90 Active	boolean	P1_Malf_90_Ac		
459	P1 Malfunction 90 Value	float	P1_Malf_90_P1		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
463	P1 Malfunction 91 Active	boolean	P1_Malf_91_Ac		
464	P1 Malfunction 91 Value	float	P1_Malf_91_P1		
468	P1 Malfunction 92 Active	boolean	P1_Malf_92_Ac		
469	P1 Malfunction 92 Value	float	P1_Malf_92_P1		
473	P1 Malfunction 93 Active	boolean	P1_Malf_93_Ac		
474	P1 Malfunction 93 Value	float	P1_Malf_93_P1		
478	P1 Malfunction 94 Active	boolean	P1_Malf_94_Ac		
479	P1 Malfunction 94 Value	float	P1_Malf_94_P1		
483	P1 Malfunction 95 Active	boolean	P1_Malf_95_Ac		
484	P1 Malfunction 95 Value	float	P1_Malf_95_P1		
488	P1 Malfunction 96 Value	float	P1_Malf_96_P1		
489	P1 Malfunction 96 Active	boolean	P1_Malf_96_Ac		
493	P1 Malfunction 97 Active	boolean	P1_Malf_97_Ac		
494	P1 Malfunction 97 Value	float	P1_Malf_97_P1		
498	P1 Malfunction 98 Active	boolean	P1_Malf_98_Ac		
499	P1 Malfunction 98 Value	float	P1_Malf_98_P1		
503	P1 Malfunction 99 Active	boolean	P1_Malf_99_Ac		
504	P1 Malfunction 99 Value	float	P1_Malf_99_P1		
508	P1 Malfunction 100 Active	boolean	P1_Malf_100_Ac		
509	P1 Malfunction 100 Value	float	P1_Malf_100_P1		
513	P1 Malfunction 101 Active	boolean	P1_Malf_101_Ac		
514	P1 Malfunction 101 Value	float	P1_Malf_101_P1		
518	P1 Malfunction 102 Active	boolean	P1_Malf_102_Ac		
519	P1 Malfunction 102 Value	float	P1_Malf_102_P1		
523	P1 Malfunction 103 Active	boolean	P1_Malf_103_Ac		
524	P1 Malfunction 103 Value	float	P1_Malf_103_P1		
528	P1 Malfunction 104 Active	boolean	P1_Malf_104_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
529	P1 Malfunction 104 Value	float	P1_Malf_104_P1		
533	P1 Malfunction 105 Active	boolean	P1_Malf_105_Ac		
534	P1 Malfunction 105 Value	float	P1_Malf_105_P1		
538	P1 Malfunction 106 Active	boolean	P1_Malf_106_Ac		
539	P1 Malfunction 106 Value	float	P1_Malf_106_P1		
543	P1 Malfunction 107 Active	boolean	P1_Malf_107_Ac		
544	P1 Malfunction 107 Value	float	P1_Malf_107_P1		
548	P1 Malfunction 108 Active	boolean	P1_Malf_108_Ac		
549	P1 Malfunction 108 Value	float	P1_Malf_108_P1		
553	P1 Malfunction 109 Active	boolean	P1_Malf_109_Ac		
554	P1 Malfunction 109 Value	float	P1_Malf_109_P1		
558	P1 Malfunction 110 Active	boolean	P1_Malf_110_Ac		
559	P1 Malfunction 110 Value	float	P1_Malf_110_P1		
563	P1 Malfunction 111 Active	boolean	P1_Malf_111_Ac		
564	P1 Malfunction 111 Value	float	P1_Malf_111_P1		
568	P1 Malfunction 112 Active	boolean	P1_Malf_112_Ac		
569	P1 Malfunction 112 Value	float	P1_Malf_112_P1		
573	P1 Malfunction 113 Active	boolean	P1_Malf_113_Ac		
574	P1 Malfunction 113 Value	float	P1_Malf_113_P1		
578	P1 Malfunction 114 Active	boolean	P1_Malf_114_Ac		
579	P1 Malfunction 114 Value	float	P1_Malf_114_P1		
583	P1 Malfunction 115 Active	boolean	P1_Malf_115_Ac		
584	P1 Malfunction 115 Value	float	P1_Malf_115_P1		
588	P1 Malfunction 116 Active	boolean	P1_Malf_116_Ac		
589	P1 Malfunction 116 Value	float	P1_Malf_116_P1		
593	P1 Malfunction 117 Active	boolean	P1_Malf_117_Ac		
594	P1 Malfunction 117 Value	float	P1_Malf_117_P1		

Table 30.6-X   Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
598	P1 Malfunction 118 Active	boolean	P1_Malf_118_Ac		
599	P1 Malfunction 118 Value	float	P1_Malf_118_P1		
603	P1 Malfunction 119 Active	boolean	P1_Malf_119_Ac		
604	P1 Malfunction 119 Value	float	P1_Malf_119_P1		
608	P1 Malfunction 120 Active	boolean	P1_Malf_120_Ac		
609	P1 Malfunction 120 Value	float	P1_Malf_120_P1		
613	P1 Malfunction 121 Active	boolean	P1_Malf_121_Ac		
614	P1 Malfunction 121 Value	float	P1_Malf_121_P1		
618	P1 Malfunction 122 Active	boolean	P1_Malf_122_Ac		
619	P1 Malfunction 122 Value	float	P1_Malf_122_P1		
623	P1 Malfunction 123 Active	boolean	P1_Malf_123_Ac		
624	P1 Malfunction 123 Value	float	P1_Malf_123_P1		
628	P1 Malfunction 124 Active	boolean	P1_Malf_124_Ac		
629	P1 Malfunction 124 Value	float	P1_Malf_124_P1		
633	P1 Malfunction 125 Active	boolean	P1_Malf_125_Ac		
634	P1 Malfunction 125 Value	float	P1_Malf_125_P1		
638	P1 Malfunction 126 Active	boolean	P1_Malf_126_Ac		
639	P1 Malfunction 126 Value	float	P1_Malf_126_P1		
643	P1 Malfunction 127 Active	boolean	P1_Malf_127_Ac		
644	P1 Malfunction 127 Value	float	P1_Malf_127_P1		
648	P1 Malfunction 128 Active	boolean	P1_Malf_128_Ac		
649	P1 Malfunction 128 Value	float	P1_Malf_128_P1		
653	P1 Malfunction 129 Active	boolean	P1_Malf_129_Ac		
654	P1 Malfunction 129 Value	float	P1_Malf_129_P1		
658	P1 Malfunction 130 Active	boolean	P1_Malf_130_Ac		
659	P1 Malfunction 130 Value	float	P1_Malf_130_P1		
663	P1 Malfunction 131 Active	boolean	P1_Malf_131_Ac		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
664	P1 Malfunction 131 Value	float	P1_Malf_131_P1		
668	P1 Malfunction 132 Active	boolean	P1_Malf_132_Ac		
669	P1 Malfunction 132 Value	float	P1_Malf_132_P1		
673	P1 Malfunction 133 Active	boolean	P1_Malf_133_Ac		
674	P1 Malfunction 133 Value	float	P1_Malf_133_P1		
678	P1 Malfunction 134 Active	boolean	P1_Malf_134_Ac		
679	P1 Malfunction 134 Value	float	P1_Malf_134_P1		
683	P1 Malfunction 135 Active	boolean	P1_Malf_135_Ac		
684	P1 Malfunction 135 Value	float	P1_Malf_135_P1		
688	P1 Malfunction 136 Active	boolean	P1_Malf_136_Ac		
689	P1 Malfunction 136 Value	float	P1_Malf_136_P1		
693	P1 Malfunction 137 Active	boolean	P1_Malf_137_Ac		
694	P1 Malfunction 137 Value	float	P1_Malf_137_P1		
698	P1 Malfunction 138 Active	boolean	P1_Malf_138_Ac		
699	P1 Malfunction 138 Value	float	P1_Malf_138_P1		
703	P1 Malfunction 139 Active	boolean	P1_Malf_139_Ac		
704	P1 Malfunction 139 Value	float	P1_Malf_139_P1		
708	P1 Malfunction 140 Active	boolean	P1_Malf_140_Ac		
709	P1 Malfunction 140 Value	float	P1_Malf_140_P1		
713	P1 Malfunction 141 Active	boolean	P1_Malf_141_Ac		
714	P1 Malfunction 141 Value	float	P1_Malf_141_P1		
718	P1 Malfunction 142 Active	boolean	P1_Malf_142_Ac		
719	P1 Malfunction 142 Value	float	P1_Malf_142_P1		
723	P1 Malfunction 143 Active	boolean	P1_Malf_143_Ac		
724	P1 Malfunction 143 Value	float	P1_Malf_143_P1		
728	P1 Malfunction 144 Active	boolean	P1_Malf_144_Ac		
729	P1 Malfunction 144 Value	float	P1_Malf_144_P1		

Table 30.6-X Malfunction Control Message Format 2 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
733	P1 Malfunction 145 Active	boolean	P1_Malf_145_Ac		
734	P1 Malfunction 145 Value	float	P1_Malf_145_P1		
738	P1 Malfunction 146 Active	boolean	P1_Malf_146_Ac		
739	P1 Malfunction 146 Value	float	P1_Malf_146_P1		
743	P1 Malfunction 147 Active	boolean	P1_Malf_147_Ac		
744	P1 Malfunction 147 Value	float	P1_Malf_147_P1		
748	P1 Malfunction 148 Active	boolean	P1_Malf_148_Ac		
749	P1 Malfunction 148 Value	float	P1_Malf_148_P1		
753	P1 Malfunction 149 Active	boolean	P1_Malf_149_Ac		
754	P1 Malfunction 149 Value	float	P1_Malf_149_P1		
758	P1 Malfunction 150 Active	boolean	P1_Malf_150_Ac		
759	P1 Malfunction 150 Value	float	P1_Malf_150_P1		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
1	Source ID	int_16	none		Fixed value = 1 for CSIOP
3	Destination ID	int_16	none		Unique value for PTS, defined by SSTF
5	Message Type	unsigned_8	none		Fixed value = 4 for Malf Control message
6	Version	int_8	none		Version = 1 for this message format
7	Message Length	int_16	none		Fixed value = 462
9	Sequence Number	unsigned_16	none		Sequence count maintained by CSIOP
11	Control Field	unsigned_16	none		Format number = 3 for P2 Malf message
****	** Data parameters**	**450 bytes	******	******	******
13	P2 Malfunction 1 Active	boolean	P2_Malf_1_Ac		
14	P2 Malfunction 1 Value 1	float	P2_Malf_1_P1		
18	P2 Malfunction 1 Value 2	float	P2_Malf_1_P2		
22	P2 Malfunction 2 Active	boolean	P2_Malf_2_Ac		
23	P2 Malfunction 2 Value 1	float	P2_Malf_2_P1		
27	P2 Malfunction 2 Value 2	float	P2_Malf_2_P2		
31	P2 Malfunction 3 Active	boolean	P2_Malf_3_Ac		
32	P2 Malfunction 3 Value 1	float	P2_Malf_3_P1		
36	P2 Malfunction 3 Value 2	float	P2_Malf_3_P2		
40	P2 Malfunction 4 Active	boolean	P2_Malf_4_Ac		
41	P2 Malfunction 4 Value 1	float	P2_Malf_4_P1		
45	P2 Malfunction 4 Value 2	float	P2_Malf_4_P2		
49	P2 Malfunction 5 Active	boolean	P2_Malf_5_Ac		
50	P2 Malfunction 5 Value 1	float	P2_Malf_5_P1		
54	P2 Malfunction 5 Value 2	float	P2_Malf_5_P2		
58	P2 Malfunction 6 Active	boolean	P2_Malf_6_Ac		
59	P2 Malfunction 6 Value 1	float	P2_Malf_6_P1		
63	P2 Malfunction 6 Value 2	float	P2_Malf_6_P2		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
67	P2 Malfunction 7 Active	boolean	P2_Malf_7_Ac		
68	P2 Malfunction 7 Value 1	float	P2_Malf_7_P1		
72	P2 Malfunction 7 Value 2	float	P2_Malf_7_P2		
76	P2 Malfunction 8 Active	boolean	P2_Malf_8_Ac		
77	P2 Malfunction 8 Value 1	float	P2_Malf_8_P1		
81	P2 Malfunction 8 Value 2	float	P2_Malf_8_P2		
85	P2 Malfunction 9 Active	boolean	P2_Malf_9_Ac		
86	P2 Malfunction 9 Value 1	float	P2_Malf_9_P1		
90	P2 Malfunction 9 Value 2	float	P2_Malf_9_P2		
94	P2 Malfunction 10 Active	boolean	P2_Malf_10_Ac		
95	P2 Malfunction 10 Value 1	float	P2_Malf_10_P1		
99	P2 Malfunction 10 Value 2	float	P2_Malf_10_P2		
103	P2 Malfunction 11 Active	boolean	P2_Malf_11_Ac		
104	P2 Malfunction 11 Value 1	float	P2_Malf_11_P1		
108	P2 Malfunction 11 Value 2	float	P2_Malf_11_P2		
112	P2 Malfunction 12 Active	boolean	P2_Malf_12_Ac		
113	P2 Malfunction 12 Value 1	float	P2_Malf_12_P1		
117	P2 Malfunction 12 Value 2	float	P2_Malf_12_P2		
121	P2 Malfunction 13 Active	boolean	P2_Malf_13_Ac		
122	P2 Malfunction 13 Value 1	float	P2_Malf_13_P1		
126	P2 Malfunction 13 Value 2	float	P2_Malf_13_P2		
130	P2 Malfunction 14 Active	boolean	P2_Malf_14_Ac		
131	P2 Malfunction 14 Value 1	float	P2_Malf_14_P1		
135	P2 Malfunction 14 Value 2	float	P2_Malf_14_P2		
139	P2 Malfunction 15 Active	boolean	P2_Malf_15_Ac		
140	P2 Malfunction 15 Value 1	float	P2_Malf_15_P1		
144	P2 Malfunction 15 Value 2	float	P2_Malf_15_P2		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
148	P2 Malfunction 16 Active	boolean	P2_Malf_16_Ac		
149	P2 Malfunction 16 Value 1	float	P2_Malf_16_P1		
153	P2 Malfunction 16 Value 2	float	P2_Malf_16_P2		
157	P2 Malfunction 17 Active	boolean	P2_Malf_17_Ac		
158	P2 Malfunction 17 Value 1	float	P2_Malf_17_P1		
162	P2 Malfunction 17 Value 2	float	P2_Malf_17_P2		
166	P2 Malfunction 18 Active	boolean	P2_Malf_18_Ac		
167	P2 Malfunction 18 Value 1	float	P2_Malf_18_P1		
171	P2 Malfunction 18 Value 2	float	P2_Malf_18_P2		
175	P2 Malfunction 19 Active	boolean	P2_Malf_19_Ac		
176	P2 Malfunction 19 Value 1	float	P2_Malf_19_P1		
180	P2 Malfunction 19 Value 2	float	P2_Malf_19_P2		
184	P2 Malfunction 20 Active	boolean	P2_Malf_20_Ac		
185	P2 Malfunction 20 Value 1	float	P2_Malf_20_P1		
189	P2 Malfunction 20 Value 2	float	P2_Malf_20_P2		
193	P2 Malfunction 21 Active	boolean	P2_Malf_21_Ac		
194	P2 Malfunction 21 Value 1	float	P2_Malf_21_P1		
198	P2 Malfunction 21 Value 2	float	P2_Malf_21_P2		
202	P2 Malfunction 22 Active	boolean	P2_Malf_22_Ac		
203	P2 Malfunction 22 Value 1	float	P2_Malf_22_P1		
207	P2 Malfunction 22 Value 2	float	P2_Malf_22_P2		
211	P2 Malfunction 23 Active	boolean	P2_Malf_23_Ac		
212	P2 Malfunction 23 Value 1	float	P2_Malf_23_P1		
216	P2 Malfunction 23 Value 2	float	P2_Malf_23_P2		
220	P2 Malfunction 24 Active	boolean	P2_Malf_24_Ac		
221	P2 Malfunction 24 Value 1	float	P2_Malf_24_P1		
225	P2 Malfunction 24 Value 2	float	P2_Malf_24_P2		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
229	P2 Malfunction 25 Active	boolean	P2_Malf_25_Ac		
230	P2 Malfunction 25 Value 1	float	P2_Malf_25_P1		
234	P2 Malfunction 25 Value 2	float	P2_Malf_25_P2		
238	P2 Malfunction 26 Active	boolean	P2_Malf_26_Ac		
239	P2 Malfunction 26 Value 1	float	P2_Malf_26_P1		
243	P2 Malfunction 26 Value 2	float	P2_Malf_26_P2		
247	P2 Malfunction 27 Active	boolean	P2_Malf_27_Ac		
248	P2 Malfunction 27 Value 1	float	P2_Malf_27_P1		
252	P2 Malfunction 27 Value 2	float	P2_Malf_27_P2		
256	P2 Malfunction 28 Active	boolean	P2_Malf_28_Ac		
257	P2 Malfunction 28 Value 1	float	P2_Malf_28_P1		
261	P2 Malfunction 28 Value 2	float	P2_Malf_28_P2		
265	P2 Malfunction 29 Active	boolean	P2_Malf_29_Ac		
266	P2 Malfunction 29 Value 1	float	P2_Malf_29_P1		
270	P2 Malfunction 29 Value 2	float	P2_Malf_29_P2		
274	P2 Malfunction 30 Active	boolean	P2_Malf_30_Ac		
275	P2 Malfunction 30 Value 1	float	P2_Malf_30_P1		
279	P2 Malfunction 30 Value 2	float	P2_Malf_30_P2		
283	P2 Malfunction 31 Active	boolean	P2_Malf_31_Ac		
284	P2 Malfunction 31 Value 1	float	P2_Malf_31_P1		
288	P2 Malfunction 31 Value 2	float	P2_Malf_31_P2		
292	P2 Malfunction 32 Active	boolean	P2_Malf_32_Ac		
293	P2 Malfunction 32 Value 1	float	P2_Malf_32_P1		
297	P2 Malfunction 32 Value 2	float	P2_Malf_32_P2		
301	P2 Malfunction 33 Active	boolean	P2_Malf_33_Ac		
302	P2 Malfunction 33 Value 1	float	P2_Malf_33_P1		
306	P2 Malfunction 33 Value 2	float	P2_Malf_33_P2		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
310	P2 Malfunction 34 Active	boolean	P2_Malf_34_Ac		
311	P2 Malfunction 34 Value 1	float	P2_Malf_34_P1		
315	P2 Malfunction 34 Value 2	float	P2_Malf_34_P2		
319	P2 Malfunction 35 Active	boolean	P2_Malf_35_Ac		
320	P2 Malfunction 35 Value 1	float	P2_Malf_35_P1		
324	P2 Malfunction 35 Value 2	float	P2_Malf_35_P2		
328	P2 Malfunction 36 Active	boolean	P2_Malf_36_Ac		
329	P2 Malfunction 36 Value 1	float	P2_Malf_36_P1		
333	P2 Malfunction 36 Value 2	float	P2_Malf_36_P2		
337	P2 Malfunction 37 Active	boolean	P2_Malf_37_Ac		
338	P2 Malfunction 37 Value 1	float	P2_Malf_37_P1		
342	P2 Malfunction 37 Value 2	float	P2_Malf_37_P2		
346	P2 Malfunction 38 Active	boolean	P2_Malf_38_Ac		
347	P2 Malfunction 38 Value 1	float	P2_Malf_38_P1		
351	P2 Malfunction 38 Value 2	float	P2_Malf_38_P2		
355	P2 Malfunction 39 Active	boolean	P2_Malf_39_Ac		
356	P2 Malfunction 39 Value 1	float	P2_Malf_39_P1		
360	P2 Malfunction 39 Value 2	float	P2_Malf_39_P2		
364	P2 Malfunction 40 Active	boolean	P2_Malf_40_Ac		
365	P2 Malfunction 40 Value 1	float	P2_Malf_40_P1		
369	P2 Malfunction 40 Value 2	float	P2_Malf_40_P2		
373	P2 Malfunction 41 Active	boolean	P2_Malf_41_Ac		
374	P2 Malfunction 41 Value 1	float	P2_Malf_41_P1		
378	P2 Malfunction 41 Value 2	float	P2_Malf_41_P2		
382	P2 Malfunction 42 Active	boolean	P2_Malf_42_Ac		
383	P2 Malfunction 42 Value 1	float	P2_Malf_42_P1		
387	P2 Malfunction 42 Value 2	float	P2_Malf_42_P2		

Table 30.6-XI Malfunction Control Message Format 3 Layout

Byte	Contents	Type	DIS Term Suffix	PTS Term Name	Comments
391	P2 Malfunction 43 Active	boolean	P2_Malf_43_Ac		
392	P2 Malfunction 43 Value 1	float	P2_Malf_43_P1		
396	P2 Malfunction 43 Value 2	float	P2_Malf_43_P2		
400	P2 Malfunction 44 Active	boolean	P2_Malf_44_Ac		
401	P2 Malfunction 44 Value 1	float	P2_Malf_44_P1		
405	P2 Malfunction 44 Value 2	float	P2_Malf_44_P2		
409	P2 Malfunction 45 Active	boolean	P2_Malf_45_Ac		
410	P2 Malfunction 45 Value 1	float	P2_Malf_45_P1		
414	P2 Malfunction 45 Value 2	float	P2_Malf_45_P2		
418	P2 Malfunction 46 Active	boolean	P2_Malf_46_Ac		
419	P2 Malfunction 46 Value 1	float	P2_Malf_46_P1		
423	P2 Malfunction 46 Value 2	float	P2_Malf_46_P2		
427	P2 Malfunction 47 Active	boolean	P2_Malf_47_Ac		
428	P2 Malfunction 47 Value 1	float	P2_Malf_47_P1		
432	P2 Malfunction 47 Value 2	float	P2_Malf_47_P2		
436	P2 Malfunction 48 Active	boolean	P2_Malf_48_Ac		
437	P2 Malfunction 48 Value 1	float	P2_Malf_48_P1		
441	P2 Malfunction 48 Value 2	float	P2_Malf_48_P2		
445	P2 Malfunction 49 Active	boolean	P2_Malf_49_Ac		
446	P2 Malfunction 49 Value 1	float	P2_Malf_49_P1		
450	P2 Malfunction 49 Value 2	float	P2_Malf_49_P2		
454	P2 Malfunction 50 Active	boolean	P2_Malf_50_Ac		
455	P2 Malfunction 50 Value 1	float	P2_Malf_50_P1		
459	P2 Malfunction 50 Value 2	float	P2_Malf_50_P2		

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30.7 NOTES

30.7.1 Acronyms and Abbreviations

AC	Alternating Current
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
AUX	Auxiliary
BSD	Berkeley Software Distribution
Btu/sec	British thermal unit per second
C&DH	Command and Data Handling
CFM	cubic feet per minute
COTS	Commercial Off-the-Shelf
CRC	Cyclic Redundancy Check
CSIOP	Crew Station Input/Output Processor
CTE	Central Timing Equipment
DC	Direct Current
DI	Digital Input
DIS	Distributed Identifier Specification
DT	Space Flight Training Division (Mail Code)
ECLSS	Environmental Control and Life Support System
EIA	Electronics Industries Association
EPS	Electrical Power System
ESA	European Space Agency
EXPRESS	Expedite the Processing of Experiments to Space Station
F	Fahrenheit
FDS	Fire Detection System
FDS/MAINT	Fire Detection System/Maintenance Switch
FEU	Flight Equivalent Unit
FSW	Flight Software
GMT	Greenwich Mean Time
GUI	Graphical User Interface
HDR	Header
HRD	High-Rate Data
HRDL	High-Rate Data Link

I/O	Input/Output
IC	Initial Conditions
ID	Identification
IEEE	Institute for Electrical and Electronic Engineers
IIP	ISPR-Mounted Interface Panel
IOS	Instructor/Operator Station
IP	Internet Protocol
IPC	Interprocess Communication
IPS	Internet Protocol Suite
ISPR	International Standard Payload Rack
ISS	International Space Station
JSC	Johnson Space Center
Lab	U.S. Laboratory Trainer Module
LAN	Local Area Network
lb/sec	pounds per second
LNS	Laboratory Nitrogen System
MAINT	Maintenance
Malf	Malfunction
Mbps	Megabits per second
MDM	Multiplexer/Demultiplexer
MIL-STD	Military Standard
MOD	Moderate
MSFC	Marshall Space Flight Center
N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency of Japan
NEMA	National Electrical Manufacturers Association
NTSC	National Television Systems Committee
OBCS	Onboard Computer System
P/L	Payload
PAH	Payload Accommodations Handbook
PC	Personal Computer
PCS	Portable Computer System
PD	Payload Developer
PEHG	Payload Ethernet Hub Gateway
PEP	Payload Executive Processor
POIC	Payload Operations Integration Center
PRM	Programmer's Reference Manual
PRP	Pressurized Payload

PRU	Payload Resource Utilization
PSE	Payload Simulator Environment
psi	pounds per square inch
psia	pounds per square inch absolute
PSimNet	Payload Simulation Network
PSO	Parallel Switch Override
PTC	Payload Training Capability
PTS	Payload Training Simulator
PUDG	Payload User Development Guide
PWR	Power
R/T LAN	Real-Time Local Area Network
RFC	Request for Comment
RMS	Rack Maintenance Switch
RMU	Rack Mobility Unit
RPC	Remote Power Controller
RPCM	Remote Power Controller Module
RPS	Rack Power Switch
RT	Remote Terminal
RTN	Return
RTS	Real-Time Session
S/W	Software
SaC	Status and Control
SCE	Signal Conversion Equipment
SER	Simulator Event Recording
SGMT	Simulated Greenwich Mean Time
SIP	Standoff-Mounted Interface Panel
SPTC	Standalone Payload Training Capability
SSP	Space Station Program
SST	Space Station Training
SSTF	Space Station Training Facility
STD	Standard
STEP	Suitcase Test Environment for Payloads
STFx	Simulator Test Fixture
SUP	Supply
SYNC	Synchronization
TAXI	Transparent Asynchronous Transmitter/Receiver Interface
TCP	Transmission Control Protocol
TCS	Thermal Control System
TST	Training Strategy Team

U.S.	United States
UDP	User Datagram Protocol
UIP	Utility Interface Panel
UOP	Utility Outlet Panel
USA	United States of America
USAV	USA Vehicle
V	Volt
VAC	Volts Alternating Current
VDC	Volts Direct Current
VDU	Visual Distribution Unit
VSD	Video Switching and Distribution

PAYLOAD USER DEVELOPMENT GUIDE (PUDG)

FOR THE

SPACE STATION TRAINING FACILITY (SSTF)

PAYLOAD TRAINING CAPABILITY (PTC)

APPENDIX IV

PAYLOAD TRAINING SUPPORT ITEMS (PTSIs)

CONTRACT NO. NAS9-18181, SCHEDULE C

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40.1 INTRODUCTION

The Space Station Training Facility (SSTF) is a strategic, permanent resource located at the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) in Houston, Texas, established with the purpose of providing the capability to perform full-mission training of International Space Station (ISS) flight crewmembers and ground support personnel at JSC and Marshall Space Flight Center (MSFC). The SSTF provides facilities, services, training equipment, and simulations of ISS modules and the environment. The Payload Training Capability (PTC) provides additional facilities and services to support training of ISS flight crewmembers and JSC and MSFC ground support personnel on the operation of U.S.-sponsored payloads.

40.1.1 Identification

This document is Appendix IV, Payload Training Support Items (PTSIs), of SSP-50323, Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC).

40.1.2 Purpose

This document provides information about PTSIs made available from the NASA JSC SSTF Project Office for use by organizations that are developing a Payload Training Simulator (PTS) for use in the SSTF. It provides descriptions of the PTSIs and information about procedures related to PTSIs.

The primary audience for this document is personnel who have responsibilities related to providing an integrated PTS to be located in the SSTF using the PTC. Those individuals will normally be associated with the Payload Element Developer (PED), the sponsoring NASA Payload Development Center (PDC), or other support groups and contractors. In the PUDG, including this Appendix IV, those organizations are collectively known as the Payload Developer (PD).

Information about the SSTF and PTSIs can be obtained as specified in Section 1.5.

40.1.3 Document Overview

This appendix consists of the following sections:

a. Section 40.1 specifies the identification, purpose, and document overview of this appendix.

b. Section 40.2 identifies reference documents related to material in this appendix.

c. Section 40.3 provides information about all PTSIs available to PDs.

d. Section 40.4 describes procedures related to requesting, use, and configuration management of PTSIs.

e. Section 40.5 provides a list of acronyms used in this appendix.

40.2 APPLICABLE DOCUMENTS

The following documents of the exact issue shown are an applicable part of this document to the extent specified herein. Subtier documents referenced in the cited documents are not applicable unless referenced within this document. In the event of conflict between the documents referenced herein and the content of this document, this document shall be considered a superseding document.

MIL-STD-1553B, Interface Standard for Digital Time Division, Command/Response Multiplex Data Bus, Revision B, 21 September 1978 (updates to Notice 4, 15 January 1996)

PTS User's Guide (to be published separately for each PTS)

SSP-30257:008, U.S. Standard Equipment Rack Standard Interface Control Document, Revision D, 20 June 1996

SSP-41002, International Standard Payload Rack to NASA/ESA/NASDA Modules Interface Control Document, Revision I, 15 July 1999

SSP-41017, Rack to Mini-Pressurized Logistics Module Interface Control Document, Part 1, Revision D, 10 April 2001; Part 2, Revision F, 22 May 2000

SSP-52000-PAH-PRP, International Space Station Payload Accommodations Handbook, Pressurized Payloads, 31 August 1995

SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User's Guide for the Training Systems Contract, 31 March 2000

Drawings (CAGE 63082):

7250558, System Diagram – Payload Power Control AC Distribution

7250620, System Diagram – PTC SCE PSE Interface

7250626, System Diagram – Standard, PTC SIP/IIP Interface

7252533, Wiring List – Simulated International Standard Rack Assembly

7252536, Wiring List – International Standard Payload Rack Interface Panel (IIP)

7254023, Rack and Equipment Installation, SSTF PTC

7254056, Panel Assembly – Rack Power Switch

7254064, Pallet Assembly – Castered SSTF

7254076, Fan Assembly, Cooling, ISPR

7254082, Panel Assembly – ISPR I/F Panel (IIP)

7254117, Rack Equipment Access – Assembly

7254280, Pallet Assembly, Rack Handling

7256154, Rack, Equipment – Six Post Altered

7256155, Plate, Cover

7256166, Panel Blank – ISPR I/F (IIP)

7256174, Crate, Shipping – Reusable SSTF

7256230, Seat Track – Colorado Rack

7256761, Bracket, Card Cage

7256771, Bracket, Computer

7256772, Bracket, Rack

7256782, Circuit Card Chassis

7257134, Cable Assembly – PTC/SCE/PSE Interface

7306505, Computer

40.3 PTSI DESCRIPTIONS

PTSIs described in this section can be obtained by a PD to be included in a PTS or to be used during the development of a PTS. Procedures related to obtaining and using PTSIs are documented in Section 40.4. PTSIs include the following:

a. Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx)

b. Signal Conversion Equipment (SCE) hardware and software for use with a PSE

c. SSTF International Standard Payload Rack (ISPR), including optional components

d. Rack Mobility Unit (RMU)

e. Castered pallet

f. Rack Shipping Container (RSC)

g. SSTF ISPR-Mounted Interface Panel (IIP) and components

h. Fire Detection System/Maintenance Switch (FDS/MAINT) panel

i. Documents and drawings

A standard configuration of PTSIs is described in Section 40.4.2.

40.3.1 Payload Simulator Environment and Simulator Test Fixture

If a Class IIb or Class IIIb PTS (defined in Section 4.1) is required for a payload, it shall be based on a PSE with a configuration baselined by the NASA Payloads Control Board (PCB). The PD can obtain a combined PSE/STFx hardware and software platform for use in implementation and testing of a PTS. Procedures for requesting a PSE/STFx are given in Section 40.4.

The PSE/STFx platform is a low-cost Personal Computer (PC) and Windows NT-based computer system that combines the functionality of a PSE and STFx. Drawings related to the PSE/STFx are described in Section 40.3.6 and are available using procedures defined in Section 40.4. Specifications for the PSE/STFx are given in Appendix V. A complete description of the PSE/STFx can be found in SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User’s Guide for the Training Systems Contract. In addition to operating in a combined PSE/STFx mode, the PSE/STFx can be configured to operate in either PSE-only mode or STFx-only mode.

The PSE is a simulation environment that supports rapid development of simulation models and includes interfaces required for a PTS to be integrated into the SSTF. PSE functionality includes the following:

a. Implementation of the PTS side of the Payload Simulation Network (PSimNet) interface as defined in Appendix III.

b. Implementation of the Command and Data Handling (C&DH) MIL-STD 1553B bus Remote Terminal (RT) interface between the PTS and the Payload Multiplexer/Demultiplexer (MDM).

c. Implementation of the Payload Ethernet Hub Gateway (PEHG) interface.

d. An interface to optional SCE that provides an interface for the PTS model to equipment such as front panel devices. Refer to Section 40.3.2 for a description of the PSE SCE.

e. A simulation modeling environment using the GynSym Corporation G2 product.

f. A database definition in the form of Microsoft Excel spreadsheets, which can be modified by the PD and processed to build a G2 knowledge base for their PTS. The database simplifies transfer of data between the simulation model and the interfaces listed above.

The STFx provides support for verification and testing of PTSs prior to shipment and during integration into the SSTF at JSC. STFx functionality includes the following:

a. Implementation of the SSTF host side of the PSimNet interface as defined in Appendix III.

b. A user interface that provides a command and monitoring interface to a single PTS, using the PSimNet.

c. Implementation of a remote user interface to the Suitcase Test Environment for Payloads (STEP) for control, moding, and data exchange.

d. A simulation modeling environment using the GynSym Corporation G2 product.

e. A database definition and G2 knowledge base to generate nominal and off-nominal host core systems data to be sent to a PTS.

f. A capability to construct and execute automated or semi-automated scripts that have the capability to control the STFx model, issue commands to a PTS via the PSimNet, and initiate scripts in the STEP for control of C&DH interfaces.

The STFx is also part of the PTC Standalone Payload Training Capability (SPTC) as described in Section 4.16.

A PD will normally use a combined PSE/STFx configuration and a STEP during development and internal testing of an integrated PTS. The STFx functionality will be used for “qualification testing” of PTSs prior to shipment and during integration with the SSTF. Each PD who develops an integrated PTS will be required to verify to Payload Operations Integration Function (POIF) Simulation Engineering that the PTS meets performance requirements, including host interfaces and simulated payload malfunctions, prior to shipment of the PTS to the SSTF.

The system will be configured to PSE-only mode when an integrated PTS is being formally tested at the SSTF or is being used for training.

40.3.2 Signal Conversion Equipment for the PSE

The SCE includes the capabilities to interface a PSE computer with sensors and effectors to simulate payload equipment. Support is provided for Analog Input (AI), Analog Output (AO), Digital Input (DI), and Digital Output (DO). Drawings related to the SCE for the PSE are described in Section 40.3.6 and are available using procedures defined in Section 40.4. Specifications for the PSE interface to the SCE are given in Appendix V. A complete description of the use of SCE with a PSE can be found in SST-646. Software to support interfaces between SCE hardware and a payload model in a PTS is included in the combined PSE/STFx software configuration. A National Instruments (NI) PCI-MIO-16E-4 Peripheral Component Interconnect (PCI) bus interface card is included in the PSE hardware. A card chassis and set of SCE interface cards is included in the standard SSTF ISPR configuration, but can be optionally omitted. The standard SCE hardware components include the following NI devices:

a. SCXI-1001 12-Slot Chassis mounted in the SSTF ISPR with the SCXI-1370 Rack Mount Kit

b. SCXI-1349 Data Cable to connect the SCE interface card in the PSE to the SCXI-1001 Chassis.

c. SCXI-1100 32-Channel AI Module and SCXI-1300 Connector Block mounted in the SCXI-1001 Chassis

d. SCXI-1124 6-Channel AO Module and SCXI-1325 Connector Block mounted in the SCXI-1001 Chassis

e. SCXI-1162 32-Channel DI Module and SCXI-1326 Connector Block mounted in the SCXI-1001 Chassis

f. SCXI-1163 32-Channel DO Module and SCXI-1326 Connector Block mounted in the SCXI-1001 Chassis

g. SCXI-1180 Feedthrough Panel and SCXI-1302 Connector Block mounted in the SCXI-1001 Chassis

40.3.3 SSTF ISPRs and Related Items

The SSTF ISPR is expected to be the main supporting platform for integrated PTSs in the SSTF PTC. It conforms to the dimensions and attachment points of an ISS flight ISPR as defined in

SSP-30257:008, U.S. Standard Equipment Rack Standard Interface Control Document; SSP-41017, Rack to Mini-Pressurized Logistics Module Interface Control Document, Parts 1 and 2; and SSP-52000-PAH-PRP, International Space Station Payload Accommodations Handbook, Pressurized Payloads. It also complies with all SSTF safety and handling provisions.

Because of the limitations of the SSTF training environment, the SSTF ISPR does not support rack tilting. The completed PTS in the SSTF ISPR is required to comply with requirements for weight load and center of mass as defined in Appendix III, Section 30.4.3.1. Restrictions apply under all conditions of storage, movement, and training, including those that require extension of the equipment beyond the front of the rack.

PDs can arrange to obtain SSTF ISPRs as Government-Furnished Equipment (GFE) as described in Section 40.4. An SSTF ISPR will be shipped to the PD in a reusable RSC as described in Section 40.3.3.3.3.

If an SSTF ISPR is not used, an integrated PTS is required to be installed in a rack that complies with the dimensions, interfaces, limits, specifications, and handling provisions specified in Appendix I, Appendix III, and this section. Interface requirements include attachment of an IIP as defined in Section 40.3.4. Handling provisions include the ability to attach the rack to an RMU as defined in Section 40.3.3.3.1.

Figure 40.3.3-1 is a sketch of an SSTF ISPR indicating general measurements. Detailed drawings related to the SSTF ISPR are described in Section 40.3.6 and are available using procedures defined in Section 40.4. The SSTF ISPR as shown is a six-post rack. The center posts can be removed to configure a four-post rack to match the ISS flight ISPR configuration.

The maximum weight of items added to an SSTF ISPR is limited to 970 pounds. Total weight and other mass properties limitations that apply to a PTS using an SSTF ISPR or a PD-provided rack are given in Appendix III, Section 30.4.3.1.

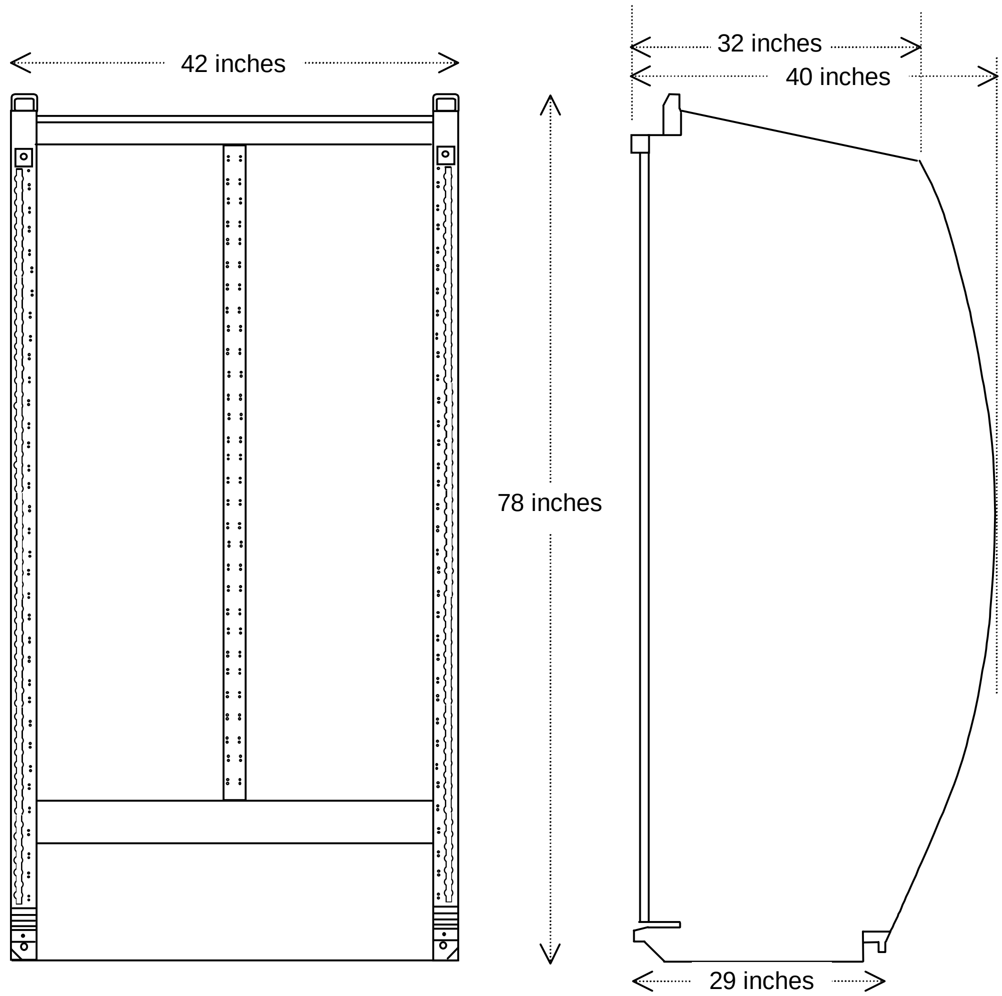

Figure 40.3.3-1 SSTF ISPR

40.3.3.1 SSTF ISPR Seat Tracks

The SSTF ISPR provides seat track assemblies mounted in positions commensurate with the flight item to accommodate the attachment of equipment required to support payload operations training. Equipment that can be attached includes the following:

a. Workstation tables

b. Man-systems equipment, including crew restraints and mobility aids

c. Payload-specific support equipment

d. Laboratory support equipment

A drawing (7256230) of the SSTF ISPR seat track is described in Section 40.3.6 and is available using procedures defined in Section 40.4.

Restrictions that apply to forces exerted by equipment attached to the seat tracks in the earth-gravity environment are shown in Figure 40.3.3.1-1.

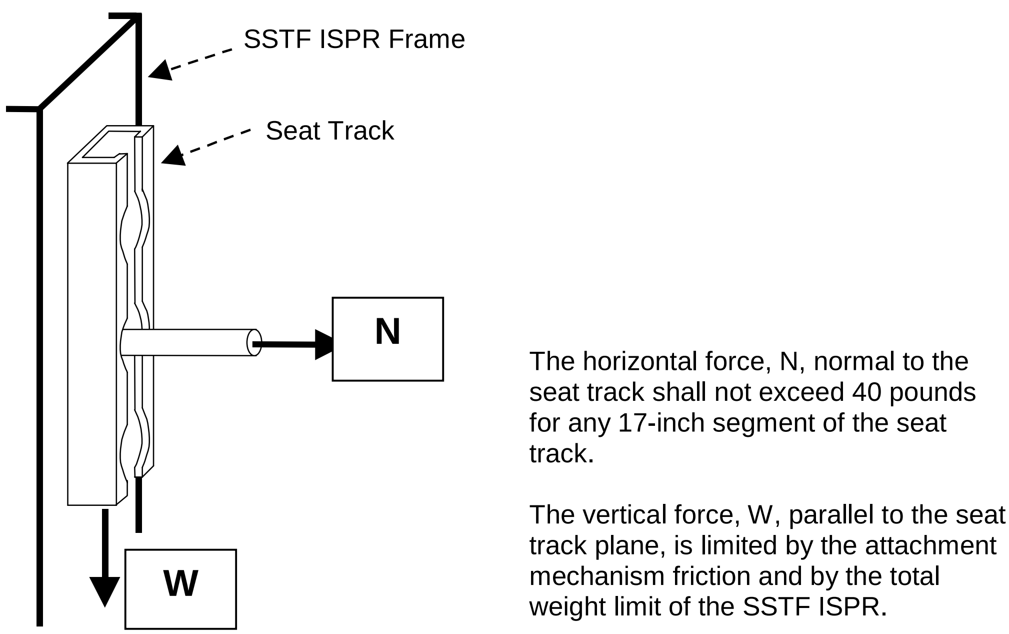

Figure 40.3.3.1-1 SSTF ISPR Seat Track Loading Restrictions

40.3.3.2 SSTF ISPR Cooling System

The SSTF ISPR can include an optional rack cooling system that provides up to 2 kilowatts of airflow heat dissipation per rack for all equipment mounted in the SSTF ISPR. Duct fans dissipate the heat generated by PTS and SSTF equipment. Air inlets will allow cool ambient facility air into the internal volume of the SSTF ISPR for removal by the duct fans.

Figure 40.3.3.2-1 provides a pictorial view of the SSTF ISPR forced air cooling system. The system includes a ventilation fan assembly consisting of two fans and a thermostat that will draw 0.52 ampere (0.94 ampere locked-rotor) at 120 VAC when operating. A drawing (7254076) of the fan assembly is described in Section 40.3.6 and is available using procedures defined in Section 40.4. The fans are mounted in the upper rear of the rack and direct rack air horizontally through holes in the fiberglass skin. Air at a nominal temperature of 65° F is drawn up through a hole in the floor around the perimeter of the Standoff-Mounted Interface Panel (SIP), passes through the 3-inch gap at each end of the IIP and the ventilation hole in the IIP, and is pushed out the rear at the top of the ISPR by the fans. Fans mounted on the top of the SSTF crew station element structures will remove the air and exhaust it into Building 5 South. This design provides cooling for up to 2 kilowatts of power dissipation in each rack. Two kilowatts of power dissipation will raise the rack outlet air temperature to approximately 101° F with the fans operating. The thermostat will be set to activate the fans at approximately 95° F. Portions of PTS equipment may experience higher ambient temperatures if the equipment arrangement restricts airflow through those portions. If a particular PTS requires equipment to provide additional cooling, it shall be provided by the PD.

When installing PTS equipment in the SSTF ISPR, the PD shall allow sufficient space around the PTS equipment to avoid restricting the airflow through the rack. It is recommended that no PTS equipment be mounted within 6 inches of a ventilation fan intake. The fans are sized to transport a nominal total of 400 CFM of cooling air through the rack enclosure. A minimum cross-sectional area of 120 square inches shall be maintained for passage of cooling air throughout the interior height of the rack.

All integrated PTSs are required to provide for complete enclosure of the front of the rack. The sides and rear of the PTS should also be enclosed to maintain proper rack ventilation and to prevent heat transfer to adjacent rack locations. If the PTS design requires removal of the rack side or rear access panels, the PD should provide a method of sealing the openings.

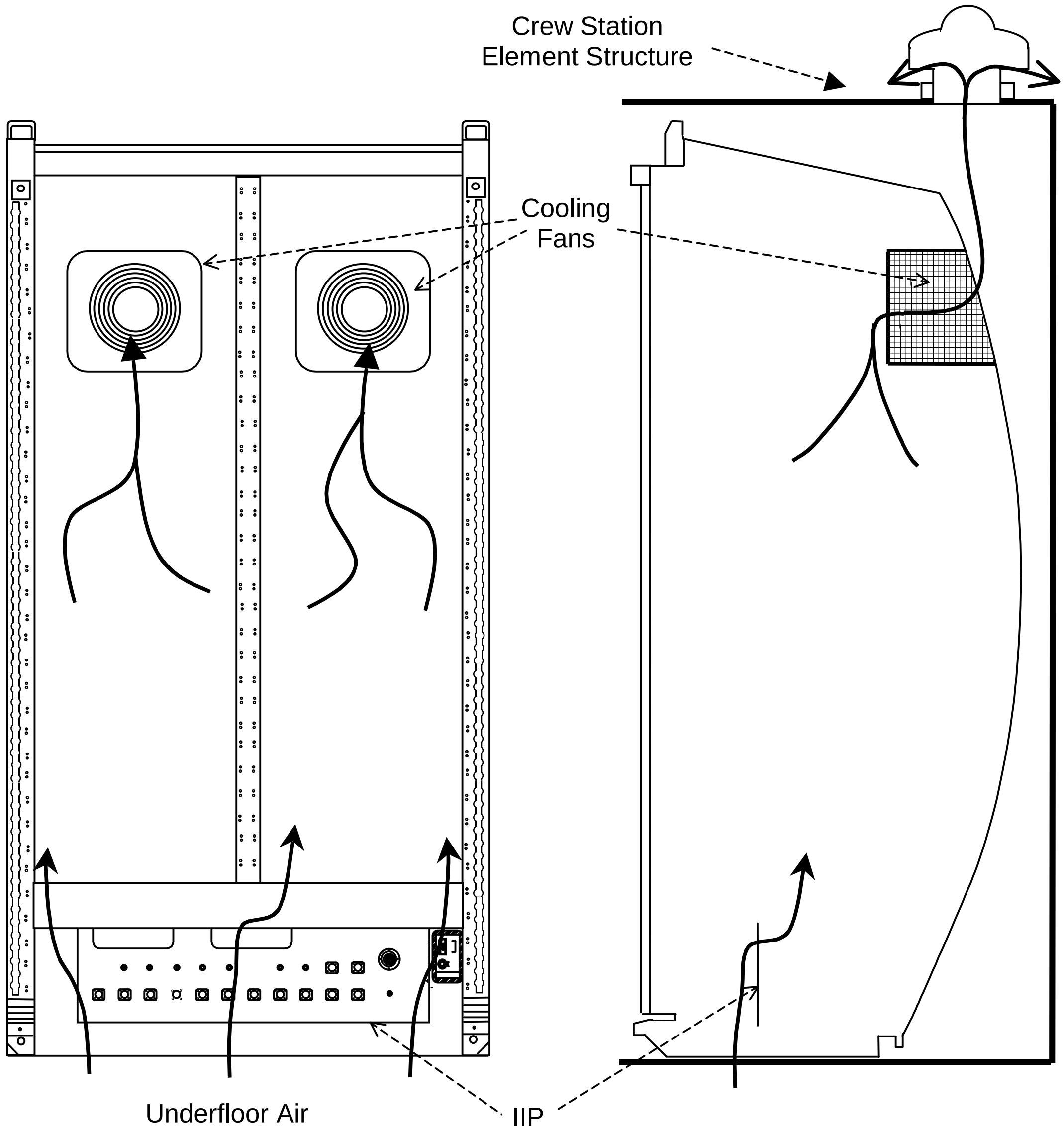

Figure 40.3.3.2-1 SSTF ISPR Cooling System

40.3.3.3 ISPR Transportability

The SSTF ISPR includes transportability features that provide for efficient and safe movement at the PD location and inside the SSTF. An RMU is used for movement of rack-level PTSs in the SSTF. A castered pallet is provided with an SSTF ISPR for use in moving it at the PD location. A sketch of the SSTF ISPR with an attached RMU mounted on a castered pallet is shown in Figure 40.3.3.3-1. A Rack and Equipment Installation drawing (7254023), showing the SSTF ISPR with an attached RMU mounted to an air-bearing pallet is described in Section 40.3.6 and is available using procedures defined in Section 40.4.

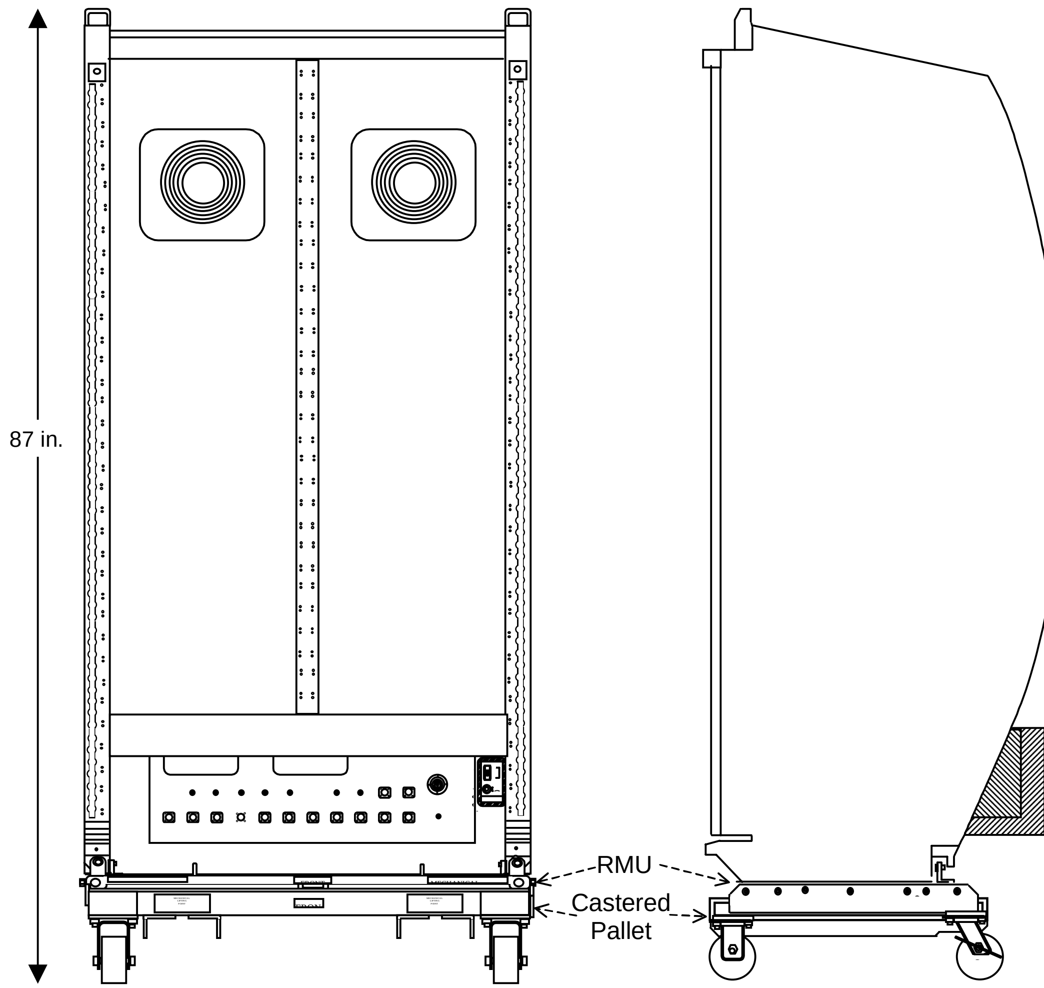

Figure 40.3.3.3-1 SSTF ISPR on RMU and Castered Pallet

40.3.3.3.1 Rack Mobility Unit

For use and movement inside the SSTF, all PTS racks will be attached to an RMU. If a PTS is installed in a PD-provided rack instead of in an SSTF ISPR, the rack must allow attachment of the RMU at the SSTF. The RMU is a pallet that attaches to an SSTF ISPR or compatible rack and accommodates two inflatable air bearings that are available in the SSTF. An SSTF-provided air pump is used to inflate the air bearings to allow movement of the SSTF ISPR over a smooth surface. The RMU will be used to allow movement inside the SSTF and will allow precise movement of racks on air-bearing surfaces included in SSTF crew station elements to support final positioning of the PTS in crew station element rack positions. Restrictions on the weight and stability considerations when a PTS is being moved using an RMU are available from the SSTF. The weight of the RMU is 101 pounds. A sketch of the RMU is shown in Figure 40.3.3.3.1-1. A drawing (7254280) of the RMU is described in Section 40.3.6 and is available using procedures defined in Section 40.4.

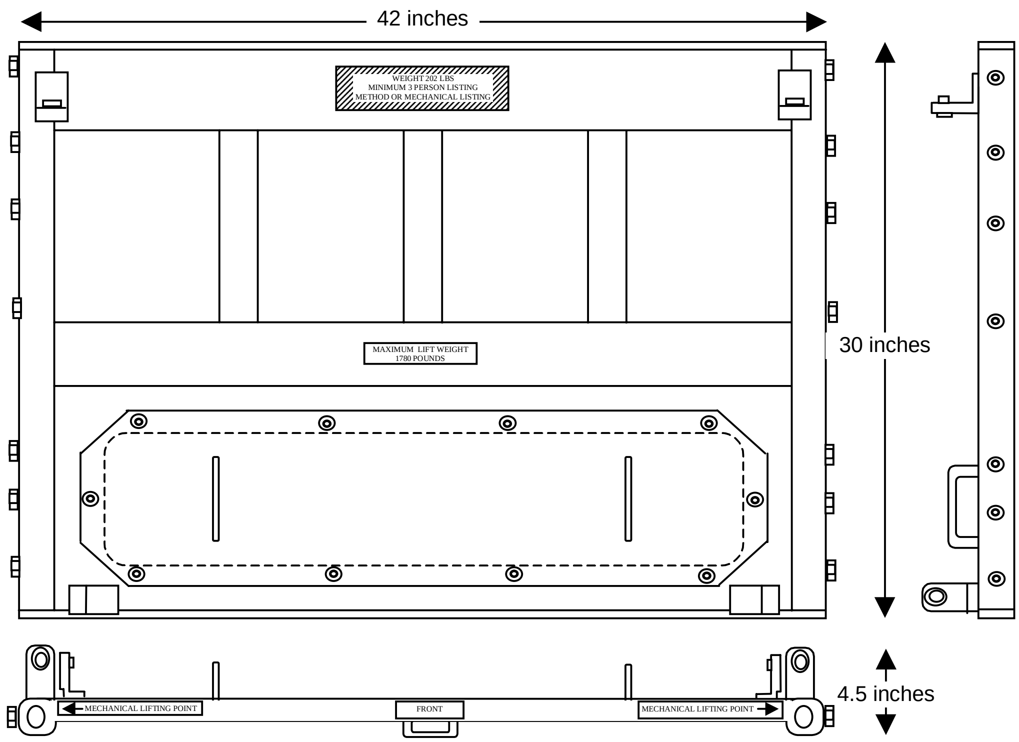

Figure 40.3.3.3.1-1 Rack Mobility Unit

40.3.3.3.2 SSTF ISPR Castered Pallet

The SSTF ISPR will be shipped to the PD attached to an RMU, which is attached to a castered pallet for easy movement of the SSTF ISPR during integration of PTS equipment. The weight of the castered palled is 190 pounds. Figure 40.3.3.3.2-1 is a sketch of the castered pallet. A drawing (7254064) of the castered pallet is described in Section 40.3.6 and is available using procedures defined in Section 40.4.

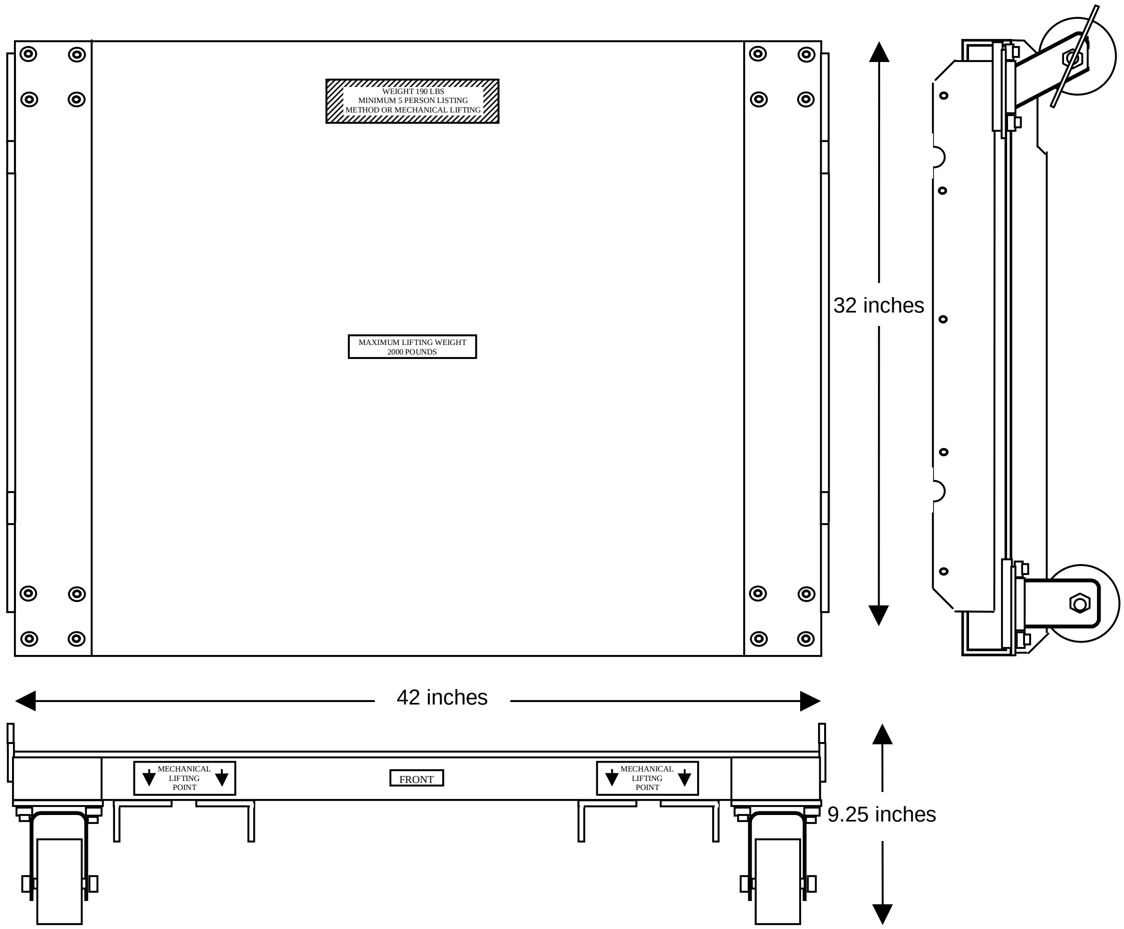

Figure 40.3.3.3.2-1 SSTF ISPR Castered Pallet

40.3.3.3.3 Rack Shipping Container

SSTF ISPRs will be shipped to the PD in a GFE RSC. The RSC is 48 inches wide, 49.9 inches deep, and 96 inches high. A drawing (7256174) of the RSC is described in Section 40.3.6 and is available using procedures defined in Section 40.4.

The RSC is designed to safely and efficiently ship an SSTF ISPR mounted on an RMU and castered pallet. The floor of the RSC includes wheel saddles for the casters on the castered pallet and foam padding shaped to restrict movement of the SSTF ISPR. An RSC containing a PTS shall be in an upright position at all times, except for limited tilting during movement as follows:

a. Tilting of the Y axis (side to side) limited to ± 10 degrees

b. Tilting of the X axis (front to back) limited to ± 5 degrees

The RSC can be taken apart for storage in a limited space at the PD location when not in use. However, since there are a limited number of RSCs, the PD may be asked to return an RSC before their PTS is ready for shipping to the SSTF. In that case, an empty RSC will be shipped to the PD later for PTS shipment. Directions relative to storage or return of an RSC will be provided by the SSTF.

40.3.4 ISPR-Mounted Interface Panel

The SSTF-provided IIP provides a mixture of simulated and functional connectors corresponding to interfaces in ISS ISPR locations as well as functional simulation-unique power and data interfaces for use by an integrated PTS. The IIP is a complementary panel to the SIP provided at each SSTF crew station element ISPR location. SSTF-provided interconnecting umbilicals are used to connect the IIP to the SIP. The IIP is designed to be mounted in vertical orientation at the bottom front of an ISPR, recessed from the ISPR front surface by 13 inches. The IIP dimensions are 13 by 35 inches. The reduced width of 35 inches, compared to the ISPR width of 42 inches, allows passage of underfloor cooling air to ventilate the rack. The front (external to the rack) side of the IIP provides interfaces to umbilicals to connect the PTS to a SIP (Figure 40.3.4-1). The back (internal to the rack) side of the IIP provides interfaces to connect PTS equipment to the IIP (Figure 40.3.4-2). Drawings of the IIP are described in Section 40.3.6 and are available using procedures defined in Section 40.4.

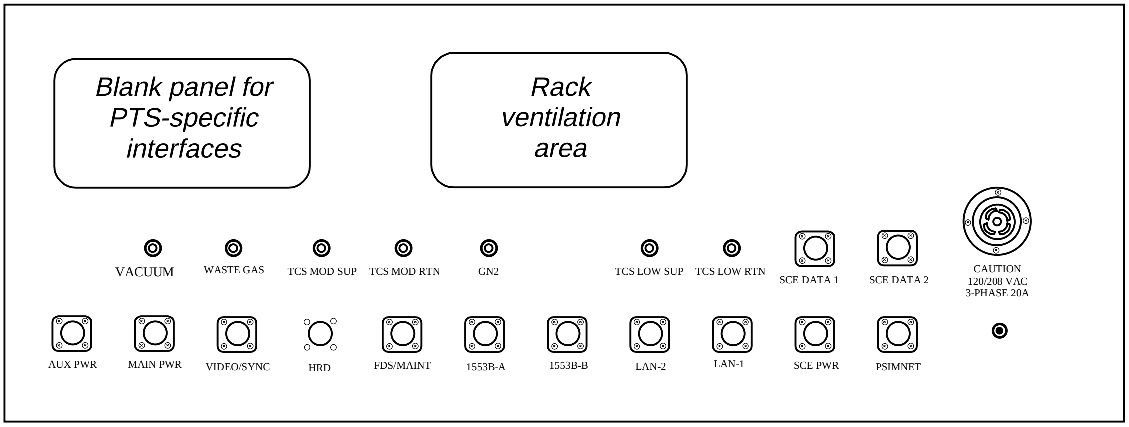

Figure 40.3.4-1 IIP Front View

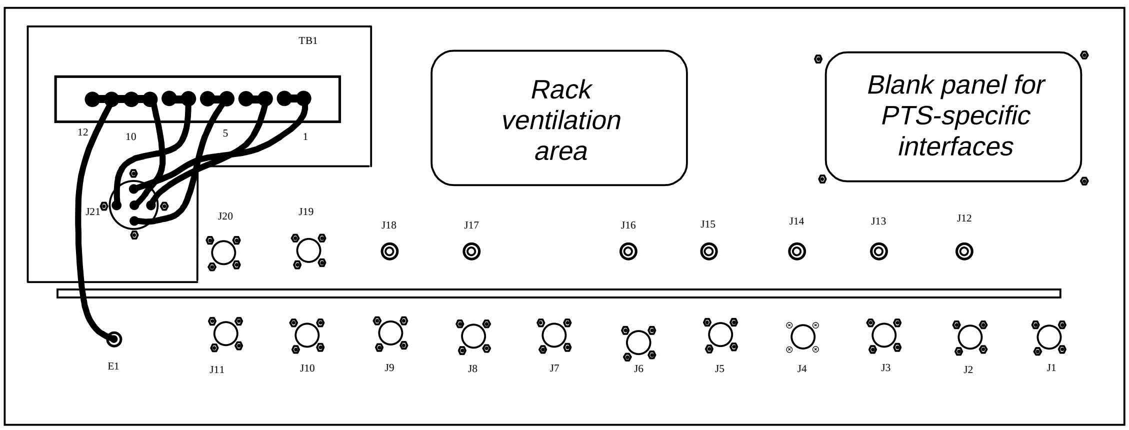

Figure 40.3.4-2 IIP Back View

The IIP contains two cutout areas. The cutout located in the upper center of the panel provides additional rack ventilation. The cutout located in the upper left of the IIP is provided for user-specific interfaces. The user-specific cutout (4 by 8 inches) is closed out by a blank panel (5 by 9 inches). This panel may be removed and machined by the PD for user-specific interfaces. A drawing (7256155) of the blank panel is listed in Section 40.3.6 and is available using procedures defined in Section 40.4.

The IIP includes the following data and electrical interfaces:

a. Connectors for active and simulated interfaces corresponding to all SIP connectors, except that no connector will be installed in the High-Rate Data (HRD) location. The IIP uses the same connector families as used on the SIP.

b. Jumpers installed in simulated resource connectors to complete the connect-status loop when the proper umbilical is installed between the IIP and the SIP.

c. Cables to connect the IIP data connectors to the respective PSE and FDS/MAINT panel interfaces. Optionally, connectors and contacts for each feedthrough connector can be obtained for use in making cables to interface the PTS to the IIP.

d. A length of preterminated RG-187 coaxial cable for the IIP video output interface.

e. A power terminal strip (TB1) on the back (internal) surface of the IIP as shown in Figure 40.3.4-2 for connection of PTS equipment to 120 VAC and/or 208 VAC and to the SSTF multipoint safety-ground system.

40.3.4.1 IIP Connector Specifications

This section provides specifications for connectors used on the IIP. It includes tables containing an IIP connector summary and showing part numbers and connector pin usage for each IIP connector. Part numbers and pin usage for these interfaces may be subject to change, based on changing SSTF requirements. The standard PTSI configuration described in Section 40.4.2 includes SSTF-provided cables to connect the IIP to PTS equipment. Part numbers and pin usage are provided to assist PDs in obtaining and wiring connectors in those cases in which the standard configuration is not used or must be modified or if cables to interface to the test equipment are required.

This section includes definitions of connectors used on the IIP for electrical simulation of the connection status of electrical, vacuum, and fluid interfaces. Those connectors are not intended for interconnection to the PTS, but are required to supply various connection status to the SSTF simulation software. The PD shall not disturb the wiring of these connectors.

Table 40.3.4.1-I provides a list of all IIP connectors and a cross-reference to the ISS Utility Interface Panel (UIP) connectors if applicable. Column one shows the connector labels on the front of the IIP. Column two shows the connector designators on the back of the IIP. Column three indicates the type of connector. Column four indicates the ISS connector reference designators, based on data contained in SSP-41002, International Standard Payload Rack to NASA/ESA/NASDA Modules Interface Control Document. Electrical power and data connectors are indicated as *J* with a number. Other connectors are for gases and fluids as shown. Connectors with *N/A* in this column are simulation unique and do not have an ISS UIP equivalent.

Table 40.3.4.1-I IIP Connector Summary

IIP Front Connector Label	IIP Back Connector Designator	Connector Type	ISS UIP Connector Reference Designator
AUX PWR	J1	Connect Status	J2 ESSENTIAL/AUXILIARY POWER
MAIN PWR	J2	Connect Status	J1 MAIN POWER
VIDEO/SYNC	J3	Video Data	J16 VIDEO/SYNC
HRD	J4	None	J7 HRD
FDS/MAINT	J5	SSTF SCE Data	J43 FDS/MAINT
1553B-A	J6	PSE Data	J3 1553B-A
1553B-B	J7	PSE Data	J4 1553B-B
LAN-2	J8	PSE Data	J47 LAN-2
LAN-1	J9	PSE Data	J46 LAN-1
VACUUM	J12	Connect Status	VACUUM
WASTE GAS	J13	Connect Status	WASTE GAS
TCS MOD SUP	J14	Connect Status	TCS MOD SUPPLY
TCS MOD RTN	J15	Connect Status	TCS MOD RETURN
GN2	J16	Connect Status	GN2
TCS LOW SUP	J17	Connect Status	TCS LOW SUPPLY
TCS LOW RTN	J18	Connect Status	TCS LOW RETURN
SCE PWR	J10	Unused	N/A
PSIMNET	J11	PSE Data	N/A
SCE DATA 1	J19	Unused	N/A
SCE DATA 2	J20	Unused	N/A
120/208 VAC	J21	Functional Power	N/A
Unlabeled	E1	Functional Ground	N/A

Table 40.3.4.1-II defines the connector and contact part numbers used on the IIP and required for connection to the IIP for the electrical and data interfaces with the PTS. Column one identifies the interface defined by each row. Column two defines the connector and contact part numbers required for connection to the front of the IIP-mounted connector. This connector is used at the IIP end of the SSTF-provided umbilical. If the PD needs to build test cables, the indicated part numbers or equivalent should be used. Column three indicates the marking on the front of the IIP for the connector. Column four defines the connector and contact part numbers mounted in the IIP. Column five indicates the marking on the back of the IIP for the connector. Column six defines the connector and contact part numbers that mate to the rear of the IIP-mounted

connector. The standard SSTF ISPR configuration includes cables to connect these IIP connectors to PTS equipment, including the PSE, the FDS/MAINT panel, and video equipment.

Table 40.3.4.1-II IIP Data and Electrical Interfaces – Connector/Contact Part Numbers

Interface	IIP Front-Mate Connector/ Contacts	IIP Front Connector Label	IIP Connector/ Contacts	IIP Back Connector Label	IIP Rear-Mate Connector/ Contacts
Functional NTSC Video Out (Note 1)	AMP 206037-1 AMP 51565-1 AMP 66399-3	VIDEO/ SYNC	AMP 206036-1 AMP 226537-1 AMP 66400-3	J3	N/A 226537-1 (Note 2)
Functional FDS/ MAINT	AMP 206037-1 AMP 66399-3	FDS/MAINT	AMP 206552-1 Preinstalled pins	J5	AMP 206554-1 AMP 66101-3, AMP 66399-3 (Note 3)
Functional 1553B-A	AMP 206037-1 AMP 66399-3	1553B-A	AMP 206552-1 Preinstalled pins	J6	AMP 206554-1 AMP 66399-3
Functional 1553B-B	AMP 206037-1 AMP 66399-3	1553B-B	AMP 206552-1 Preinstalled pins	J7	AMP 206554-1 AMP 66399-3
Functional Payload Ethernet	AMP 206037-1 AMP 66399-3	LAN-2	AMP 206552-1 Preinstalled pins	J8	AMP 206554-1 AMP 66399-3
Functional Payload Ethernet	AMP 206037-1 AMP 66399-3	LAN-1	AMP 206552-1 Preinstalled pins	J9	AMP 206554-1 AMP 66399-3
PSimNet	AMP 206037-1 AMP 66399-3	PSIMNET	AMP 206552-1	J11	AMP 206554-1 AMP 66399-3
120/208 VAC	P&S L2120-C cable receptacle	208 VAC	P&S L2120-FI flanged inlet	J21	Wired to terminal strip TB1
Safety Ground	#10-32 Ring Lug	Unlabeled	#10-32 Stud	E1	Wired to terminal strip TB1
Not used		SCE PWR		J10	
Not used		SCE Data 1		J19	
Not used		SCE Data 2		J20	

Note 1: Coaxial contacts, P/N 51565-1 or 226537-1, are used in positions 1 and 3 only. Other positions use P/N 66399-3 or 66400-3.

Note 2: PTS connects wiring to the IIP through a preterminated 10-foot length of RG-187 coaxial cable.

Note 3: Contacts 66101-3 are used in positions 1 and 2. Contacts 66399-3 are used in positions 4 and 5.

Table 40.3.4.1-III defines the connector pin usage and keying for each of the IIP functional simulated data interfaces between a PTS and the SSTF and the simulation-unique PSimNet

interface. Each interface in this table uses the connector part numbers as specified in Table 40.3.4.1-II. Pins as indicated are removed on the front side of the IIP connectors to match key plugs (AMP P/N 200821-1) in the SSTF-provided interconnecting cables so that the interconnecting cables cannot be plugged into a wrong receptacle.

Table 40.3.4.1-III Functional Electrical Interfaces – IIP Connector Pin Usage

Pin No	**IIP Connector Pin Usage**						
	VIDEO/ SYNC (Note 1)	**FDS/ MAINT**	**1553B-A** (Note 2)	**1553B-B**	**LAN-2**	**LAN-1**	**PSimNet**
1	Video in (not used)	+ 28 VDC (Smoke +)	1553B bus A +	1553B bus B +	TX +	TX +	PAIR 2 +
2	Removed	DO (Smoke -)	1553B bus A -	1553B bus B -	TX -	TX -	PAIR 2 -
3	Video out	Removed	Address bit 0	Unused	RX +	RX +	PAIR 3 +
4	Unused	DI (MAINT +)	Address bit 1	Unused	Removed	Unused	PAIR 1 +
5	Unused	R-GND (MAINT -)	Address bit 2	Unused	Unused	Removed	PAIR 1 -
6	Unused	Unused	Address bit 3	Unused	RX -	RX -	PAIR 3 -
7	Unused	Unused	Removed	Unused	Shield	Shield	PAIR 4 +
8	Unused	Unused	Address bit 4	Removed	Unused	Unused	PAIR 4 -
9	Unused	Unused	Address Parity		Unused	Unused	
10	Unused	Unused	Address common	Unused	Unused	Unused	Unused
11	Unused	Unused	Cable shield	Cable shield	Unused	Unused	Unused
12	Unused	Unused	Unused	Unused	Unused	Unused	Unused
13	Unused	Unused	Unused	Unused	Unused	Unused	Shield
14	Unused	Unused	Unused	Unused	Unused	Unused	Unused
15	Unused	Unused	Unused	Unused	Unused	Unused	Unused
16	Unused	Unused	Unused	Unused	Unused	Unused	Unused

Note 1: Simulator video supports NTSC composite. Separate sync signals are not supported. Video addressing is not supported.

Note 2: The address pins are connected to SIP-mounted thumbwheel switches, but are not used.

Table 40.3.4.1-IV defines the connector pin usage for connectors used on the IIP for electrical simulation of the connection status of electrical, vacuum, and fluid interfaces. The PD shall not disturb the wiring of these connectors.

Table 40.3.4.1-IV Simulated Electrical, Vacuum, and Fluid Status Connector PIN Usage

Interface	IIP Front Connector Label	IIP Back Connector Label	Active Pin	Ground Pin	Removed Pin
Simulated Auxiliary Power	AUX PWR	J1	1	2	10
Simulated Main Power	MAIN PWR	J2	1	2	11
Simulated Vacuum System	VACUUM	J12	1	3	None
Simulated Waste Gas System	WASTE GAS	J13	1	4	None
Simulated TCS Moderate Temperature Supply	TCS MOD SUP	J14	1	5	None
Simulated TCS Moderate Temperature Return	TCS MOD RTN	J15	1	6	None
Simulated Gaseous Nitrogen	GN2	J16	1	9	None
Simulated TCS Low-Temperature Supply	TCS LOW SUP	J17	1	7	None
Simulated TCS Low-Temperature Return	TCS LOW RTN	J18	1	8	None

Simulated electrical connectors on the IIP are AMP part number 206552-1. They mate with the AMP part number 206037-1 connector with part number 66399-3 contacts used on the end of the interconnecting cables. Contacts on the back of the IIP are prejumpered between the active pin and the ground pin indicated in Table 40.3.4-IV to provide connection status to be returned via the SSTF SCE to the SSTF software models when the matching cable is connected from the IIP to the SIP. One pin is removed as shown on each connector on the front of the IIP to prevent cross-connection.

Simulated vacuum and fluid quick disconnects on the IIP are the Hypertronics part number D02EE125FRT connector with part number YSK005-037G contacts. They mate with the Hypertronics part number D02P125MST connector with part number YPN005-050G contacts used on the end of the interconnecting cables. Contacts on the back of the IIP are prejumpered between the active pin and the ground pin indicated in Table 40.3.4.1-IV to provide connection status to be returned via the SSTF SCE to the SSTF software models when the matching cable is connected from the IIP to the SIP. These interfaces are not keyed to physically prevent cross-connection. Proper connectivity is indicated by color-coding and/or labeling of connectors and cables.

40.3.4.2 IIP Electrical Power Wiring

Power terminal strip TB1 is provided on the back (internal) surface of the IIP for connection of the PTS equipment to 120 VAC and/or 208 VAC power and to the SSTF multipoint safety-ground system. Figure 40.3.4.2-1 shows the connections from the 120/208 VAC connector (J21) and ground (E1) are wired to TB1 and the jumpers used to connect the terminals on TB1 for common points. The text shown in italics in the figure is explanatory text and is not actually on TB1.

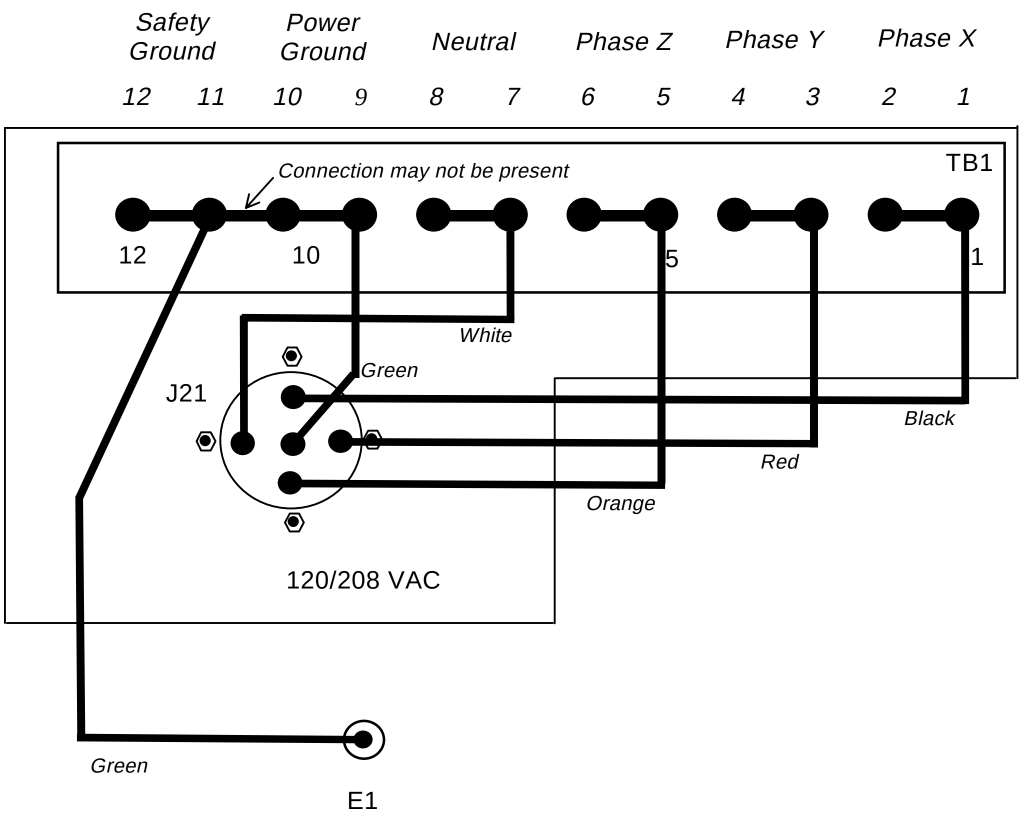

Figure 40.3.4.2-1 IIP Power and Ground Connections

Note that the TB1 connection of power ground terminals 9 and 10 to safety ground terminals 11 and 12 may not always be present. The connection will normally be present on TB1 when the IIP is shipped to the PD, since it is expected that the PD will not have separate power and safety grounds. However, the connection may be removed when the completed PTS is installed in an SSTF crew station element that has separate power and safety ground connections. The PTS shall be designed and implemented so that it is safe and works correctly with the power ground and safety ground terminals either connected together or separated.

If the IIP is shipped installed in an SSTF ISPR, connections may be made to TB1 for 120 VAC power for devices included in or with the SSTF ISPR. Figure 40.4.2-2 in Section 40.4.2 shows the wiring of TB1 for devices included in a standard SSTF ISPR configuration.

The PD shall attach electrical equipment to TB1 as required for either 208 VAC or 120 VAC devices. For PD-added 120 VAC devices, connections can be made to neutral (terminal 7 or 8) and any one of the terminal pairs shown for phase X, Y, or Z. However, changes to the power phase used by a PTS may be required to maintain balanced currents between the phases within the SSTF. Wires attached to TB1 shall be long enough to allow them to be moved at the SSTF from the terminal for the phase chosen to a terminal for any of the other two phases. If the PTS requires any specific power phase relationships, they shall be documented in the PTS User's Guide.

40.3.5 Fire Detection System/Maintenance Switch Panel

An FDS/MAINT panel assembly is available from the SSTF to provide simulations of the ISS FDS Smoke Indication light and Rack Power Switch (RPS). Note that the RPS was previously known as the Rack Maintenance Switch (RMS) and that name is still used in some SSTF documents and drawings. The SSTF simulation of the Fire Detection System is described in Section 4.5.3.4. The SSTF simulation of the RPS function is described in Section 4.5.4. A sketch of the FDS/MAINT panel assembly is shown in Figure 40.3.5-1. A drawing (7254056) of the FDS/MAINT panel is described in Section 40.3.6 and is available using procedures defined in Section 40.4. The standard configuration for an SSTF ISPR includes an FDS/MAINT panel assembly mounted to the rack front panel mounting rails near the right end of the IIP, as shown in Figure 40.4.2-1. The assembly is prewired to the corresponding IIP connector defined in Section 40.3.4.1.

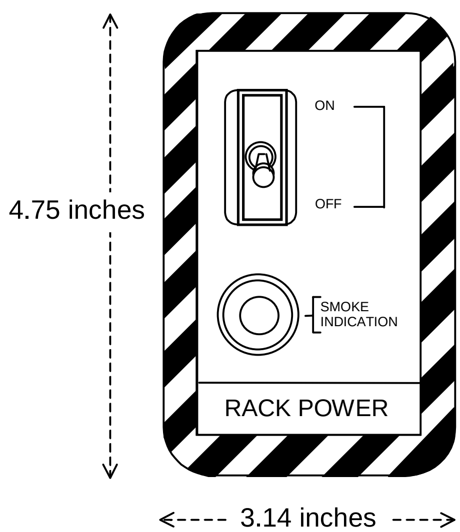

Figure 40.3.5-1 FDS/MAINT Panel

If the PD does not use an SSTF ISPR, an FDS/MAINT panel can be obtained from the SSTF. If the standard SSTF FDS/MAINT panel is not used for an integrated PTS, the PD shall provide for the FDS/MAINT function and interconnection to the IIP as specified in Section 40.3.4.

40.3.6 Documents and Drawings

Documents and drawings related to PD development of a PTS can be obtained from the SSTF by requesting them using the contact specified in Section 1.5.

Electronic copies of the current revision of the documents listed in Table 40.3.6-I can be obtained upon request.

Table 40.3.6-I Documents

Document Number	Document Name	Description
SSP-50323	Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC)	The complete PUDG, including this Appendix IV.
SST-646	Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User's Guide for the Training Systems Contract	Complete documentation for users of the PSE and STFx. For PSE and STFx specifications, see PUDG Appendix V.

Copies of the current revision of the drawings listed in Table 40.3.6-II are included in a standard drawing set that can be obtained upon request from the SSTF to facilitate design of an SSTF compatible rack. Copies of individual drawings are available if the complete set is not required.

Table 40.3.6-II Standard Drawing Set

Drawing Number	Drawing Name	Description
7306505	Computer	PSE/STFx Computer Specification Control. Refer to Section 40.3.1. For drawing Revision F, as of the publication date of this document, the PSE configuration to be provided to PDs is indicated as -003 for systems to be used only in the U.S. or -004 for systems to be exported.
7256782	Circuit Card Chassis	SCE SCXI-1001 Chassis, showing standard card configuration. Refer to Section 40.3.2.
7250620	System Diagram – PTC SCE PSE Interface	Data connectivity diagram for equipment inside the standard SSTF ISPR, with more details shown for the PSE and the optional standard set of SCE. Refer to Sections 40.3.1 and 40.3.2.

Drawing Number	Drawing Name	Description
7250558	System Diagram – Payload Power Control AC Distribution	SSTF power control and connection diagram. Sheet 3 should be of most interest to the PD. It shows wiring of the IIP (A2A1) Power Terminal Strip (TB1) to the Cooling Fan Assembly (A3A1), the PSE computer (A4A2), the SCE Chassis (A5A2), and a 120 VAC power plug (A2A3) located on the rack left front post. It also includes a connection diagram that indicates terminals to be used for PTS equipment requiring 120 or 208 VAC power (refer to Section 40.3.4).
7250626	System Diagram – Standard, PTC SIP/IIP Interface	Wiring from SSTF through the SIP to the IIP on an SSTF ISPR. Refer to Section 40.3.4. Sheet 1 shows simulated data interfaces that will be used by the PTS. Sheet 2 shows standard wiring for the FDS/MAINT panel and wiring for simulated connect status for fluids and vacuum. Sheet 3 shows the PSimNet interface and wiring for simulated connect status for GN2 and Main and Auxiliary Power. Wiring shown on Sheet 2 for SCE power connector and on Sheet 3 for SCE Data 1 and SCE Data 2 should be ignored since the connectors are unused.
7257134	Cable Assembly – PTC/SCE/PSE Interface	The standard set of cables for data and power connections from the IIP to the PSE computer and the SCE chassis. The cables are normally included with the SSTF ISPR. Note that the cable from the 1553B-A connector on the IIP is a "Y" cable that goes to the PSE computer 1553B card and to the SCE chassis digital input channels. The connections to the SCE digital input channels are to SIP thumbwheel RT address switches that are no longer used.
7254023	Rack and Equipment Installation, SSTF PTC	Standard configuration for SSTF ISPR with RMU and castered pallet attached and PSE and SCE chassis installed. Refer to Section 40.3.3 and its subsections.
7252533	Wiring List – Simulated International Standard Rack Assembly	Wiring list for 7254023. Documents electrical power wiring from the IIP terminal block to the fan assembly, PSE, and SCE chassis.
7254082	Panel Assembly – ISPR I/F Panel (IIP)	Complete IIP showing outfitting and labeling. Refer to Section 40.3.4. Note that labels indicated by an asterisk (*) are on the back of the IIP.

Drawing Number	Drawing Name	Description
7252536	Wiring List – International Standard Payload Rack Interface Panel (IIP)	Wiring list for IIP as shown in Drawing 7254082. Documents wiring for simulated connect status connectors J12 - J18, wiring for ground, and wiring of IIP terminal block TB1. Wiring documented in this drawing should not be changed by the PD except for those identified as *External Wiring*.
7256166	Panel Blank – ISPR I/F (IIP)	Detailed specifications for the IIP blank panel.
7256761	Bracket, Card Cage	Bracket used to mount the SCE chassis to the SSTF ISPR.
7256771	Bracket, Computer	Bracket used to mount the PSE computer (type -003 or -004) to the SSTF ISPR.
7256772	Bracket, Rack	Bracket used only for four-post SSTF ISPR. It provides a stub replacement for the back center post to be used to mount brackets for the PSE computer and SCE chassis.
7254280	Pallet Assembly, Rack Handling	RMU pallet assembly. Refer to Section 40.3.3.3.1.
7254064	Pallet Assembly – Castered SSTF	Castered pallet assembly. The castered pallet currently provided to the PD by the SSTF is the -002 version as shown on Sheet 2 of the drawing. Refer to Section 40.3.3.3.2.
7254117	Rack Equipment Access – Assembly	A drawing provided for reference only since it shows details of the SSTF rack construction. Much of the equipment shown is specific to SSTF systems racks, not ISPRs, and should be ignored by the PD.
7256154	Rack, Equipment – Six Post Altered	A drawing provided for use in modifications made to SSTF ISPRs for mounting of cooling fan assemblies, the PSE computer, and the SCE chassis. It shows details of the SSTF ISPR that may be useful to the PD.

Copies of the current revision of the drawings listed in Table 40.3.6-III are available on an individual basis upon request from the SSTF.

Table 40.3.6-III Additional Drawings

Drawing Number	Drawing Name	Description
7256155	Plate, Cover	Blank panel used to close out the cutout in the IIP provided for user-specific interfaces. This panel may be removed and machined by the PD for user-specific interfaces. Refer to Section 40.3.4
7254056	Panel Assembly – Rack Power Switch	FDS/MAINT panel assembly that includes the FDS smoke indicator and the rack power switch. Refer to Section 40.3.5.
7254076	Fan Assembly, Cooling, ISPR	Ventilation fan assembly included in the standard SSTF ISPR. The fans are mounted in the upper rear of the SSTF ISPR. Refer to Section 40.3.3.2.
7256230	Seat Track – Colorado Rack	Seat track assemblies included as part of the SSTF ISPR, with the same dimensions and located in the same positions as the corresponding flight item. Refer to Section 40.3.3.1
7256174	Crate, Shipping – Reusable SSTF	RSC used to ship SSTF ISPRs to and from the PD. Refer to Section 40.3.3.3.3.
SK-0593/00091-1	Rack Assembly, Four Post Mockup	Drawing from the manufacturer of the racks used for SSTF ISPRs.
SK-0593/00091-2	Assembly, Internal Structure Four Post Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.
SK-0593/00091-3	Fittings, Four Post Rack – SSMTF	Drawing from the manufacturer of the racks used for SSTF ISPRs.
SK-0593/00091-4	Assembly, Lower Attachment Mechanism Four Post Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.
SK-0593/00091-5	Skin and Access Panels, Four Post Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.
SK-0593/00091-7	Center Posts, High Fidelity Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.

Drawing Number	Drawing Name	Description
SK-0593/00091-8	Assembly, Internal Structural Six Post Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.
683-50237	Upper Attachment Mechanism Details – Equipment Rack (Boeing)	Drawing from the manufacturer of the racks used for SSTF ISPRs.
11002000004	Rack Assembly, Four Post Mockup	Drawing from the manufacturer of the racks used for SSTF ISPRs.
11002000002	Assembly, Internal Structure Four Post Rack	Drawing from the manufacturer of the racks used for SSTF ISPRs.
11002000003	Fittings, Four Post Rack – SSMTF	Drawing from the manufacturer of the racks used for SSTF ISPRs.

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40.4 PTSI PROCEDURES

This section describes procedures related to PTSIs, including requesting one or more PTSIs, use and modification of PTSIs at the PD location, and Configuration Management (CM) of PTSIs.

40.4.1 Requesting PTSIs

PTSIs or information about PTSIs may be requested by contacting the SSTF as indicated in Section 1.5.

40.4.2 PTSI Standard Configuration

A standard configuration of PTSIs has been established for the items expected to be used for most PTSs. It includes the following items:

a. An SSTF ISPR (described in Section 40.3.3) with seat tracks (described in Section 40.3.3.1) and a fan assembly (described in Section 40.3.3.2) installed

b. An IIP (described in Section 40.3.4) mounted in the SSTF ISPR

c. An FDS/MAINT panel mounted in the SSTF ISPR and connected to the IIP

d. A standard set of SCE (listed in Section 40.3.2) mounted in the SSTF ISPR

e. An RMU and a castered pallet (described in Section 40.3.3.3) attached to the SSTF ISPR

f. Cables with connectors (specified in Section 40.3.4.1) to connect the IIP 1553B, PEHG Ethernet, and PSimNet Ethernet to the PSE computer

g. Power cords for the PSE and the SCE chassis wired to the 208/120 VAC terminal block on the IIP

h. A combined PSE/STFx computer system (described in Section 40.3.1)

i. The standard set of drawings identified in Table 40.3.6-I

For the standard configuration, the SSTF ISPR, with items installed and attached to the pallets, will be shipped to the PD in an RSC. The PSE will be shipped separately for mounting in the SSTF ISPR by the PD. Figure 40.4.2-1 shows the SSTF ISPR with standard equipment mounted, including the PSE. The drawing will be shipped separately for reference.

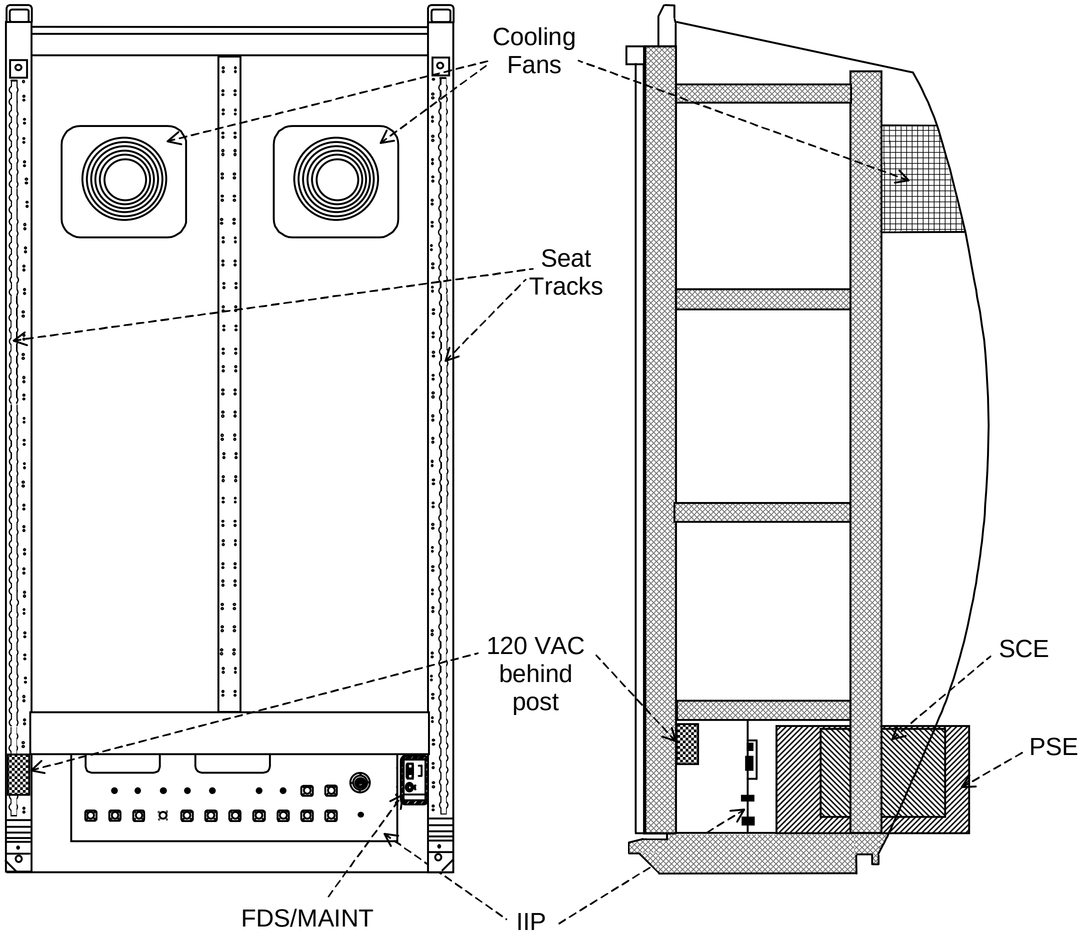

Figure 40.4.2-1   SSTF ISPR with Standard Equipment Installed

Figure 40.4.2-2 shows the wiring of the IIP electrical terminal block TB1 for 120 VAC power for devices included in the standard configuration. Refer to Section 40.3.4.2 for information needed by the PD to add PTS electrical devices.

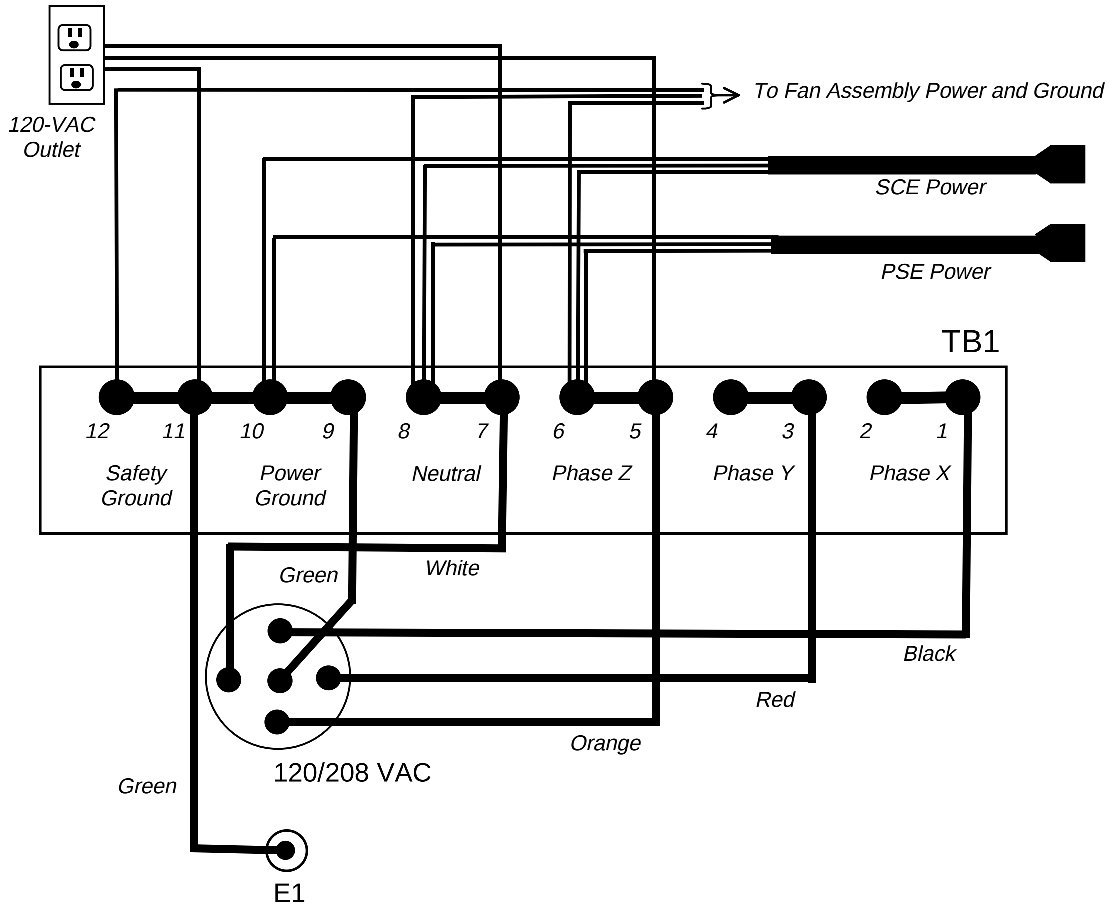

Figure 40.4.2-2 Standard IIP TB1 Electrical Wiring

40.4.3 PTSI Configuration Management

All PTSIs, including hardware, PSE/STFx software, documents, and drawings, are produced in compliance with approved requirements, design, and documentation baselines. The SSTF will apply CM processes to ensure that each PTSI produced complies with the approved baseline. All copies of a given PTSI will be as nearly equivalent as is practical, considering the availability of components from Commercial Off-the-Shelf (COTS) vendors. CM processes will also be used to ensure that PTSIs maintained in inventory remain in compliance with their approved baseline.

Changes to the baseline for a PTSI can be made only with approval of the ISS Payloads Control Board. Proposals to change the baseline for a PTSI shall include the reasons for the change and a discussion of the procedures and impacts of changing the items in the SSTF inventory, items at a PD location, and items in the PTSs in the SSTF.

If the PCB approves a change, it will be mandatory for all copies of a PTSI. Updated or replacement hardware, software, documents, or drawings will be provided to each PD who has a copy of the PTSI. The PD shall provide indication of when the change is made so that CM records can be maintained.

Changes or additions as defined in Section 40.4.4 are part of the normal use of a PTSI and will not require approval. However, the PD shall provide complete documentation of their PTS, including changes to PTSIs, in the Payload Delivery Package defined in Section 5.

40.4.4 PD Use and Modification of PTSIs

The PD is responsible for using any PTSIs supplied to them to implement a PTS in compliance with interface specifications and procedures in Appendix I and Appendix III. If the PD desires to modify any PTSI except as provided for that item, they shall obtain prior approval from the PCB as described in Section 40.4.3. Any modifications shall be promptly reported to the SSTF so that CM records of the status of the item can be maintained. Detailed documentation of the modifications shall be included in the Payload Training Delivery Package (defined in Section 5) so that the PTS can be properly integrated into the SSTF.

Since the PSE/STFx is a platform for implementation of a PD-provided model, it is expected that changes and additions will be made to the database and software using procedures described in SST-646. Any additions or changes to PSE/STFx hardware or software outside the scope described in SST-646 should be submitted for review to ensure that the changes are compatible with the PSE/STFx architecture. Documentation of any such changes shall be provided so that CM records can reflect the current status of the PSE/STFx. Complete documentation of all user changes and additions to PSE/STFx hardware and software shall be reflected in PTS documentation included in the Payload Training Delivery Package (defined in Section 5).

It is expected that the PD will add equipment to an SSTF ISPR to complete a PTS and may make changes to the ISPR to accommodate the additional equipment. Any changes that would alter the outside shape of the ISPR, modify any attachment points, or change physical, thermal, or electrical characteristics outside of normal limits shall be submitted for review and approval to ensure that the changes are compatible with the use of the ISPR in the SSTF. Changes shall also be reflected in PTS documentation included in the Payload Training Delivery Package (defined in Section 5).

The SSTF IIP is intended to have PD-provided wiring connected to it as described in Section 40.3.3. Any changes that would affect the electrical interfaces presented by the IIP to users of the PTS must be submitted for review and approval to ensure that the interfaces are compatible with the SSTF. Changes to electrical interfaces, physical changes to the IIP, and any PTS requirements for specific 120 VAC phasing shall be reflected in PTS documentation included in the Payload Training Delivery Package (defined in Section 5).

The FDS/MAINT assembly is not intended to be modified by the PD. If an SSTF-supplied FDS/MAINT assembly is not used, the interface from the PD-provided equivalent assembly to the IIP shall be reflected in PTS documentation included in the Payload Training Delivery Package (defined in Section 5).

The RSC is designed to safely and efficiently ship an unmodified SSTF ISPR with a PD-provided front panel and a PSE and PSE SCE mounted in the standard position at the bottom of the ISPR and extended out the back. If modifications are required to allow the RSC to be used with a PTS, the modifications shall be submitted for review and approval before being made. The RSC can be taken apart for storage at the PD location until it is needed for shipment of the completed PTS. However, since there is a limited number of RSCs, the PD may be asked to return an RSC before their PTS is ready for shipping to the SSTF. In that case, an empty RSC will be shipped to the PD later for the PTS shipment. Directions relative to storage or return of an RSC will be provided by the SSTF.

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40.5 NOTES

40.5.1 Acronyms and Abbreviations

AC	Alternating Current
AI	Analog Input
AO	Analog Output
AUX	Auxiliary
C&DH	Command and Data Handling
CAGE	Contractors and Government Entity
CFM	Cubic Feet per Minute
CM	Configuration Management
COTS	Commercial Off-the-Shelf
DI	Digital Input
DO	Digital Output
DRLI	Data Requirements List Item
ESA	European Space Agency
F	Fahrenheit
FDS/MAINT	Fire Detection System/Maintenance Switch
GFE	Government-Furnished Equipment
GN2	Gaseous Nitrogen
GND	Ground
HRD	High-Rate Data
I/F	Interface
IIP	ISPR-Mounted Interface Panel
ISPR	International Standard Payload Rack
ISS	International Space Station
JSC	Johnson Space Center
LAN	Local Area Network
MDM	Multiplexer/Demultiplexer
MIL-STD	Military Standard
MOD	Moderate Temperature
MSFC	Marshall Space Flight Center

N/A	Not Applicable
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency of Japan
NI	National Instruments
NT	Microsoft Windows NT Operating System
NTSC	National Television Systems Committee
P/N	Part Number
PAH	Payload Accommodations Handbook
PC	Personal Computer
PCB	Payloads Control Board
PCI	Peripheral Component Interconnect
PD	Payload Developer
PDC	Payload Development Center
PED	Payload Element Developer
PEHG	Payload Ethernet Hub Gateway
POIF	Payload Operations Integration Function
PRP	Pressurized Payload
PSE	Payload Simulator Environment
PSimNet	Payload Simulation Network
PTC	Payload Training Capability
PTS	Payload Training Simulator
PTSI	Payload Training Support Item
PUDG	Payload User Development Guide
PWR	Power
RMS	Rack Maintenance Switch
RMU	Rack Mobility Unit
RPS	Rack Power Switch
RSC	Rack Shipping Container
RT	Remote Terminal
RTN	Return
SCE	Signal Conversion Equipment
SIP	Standoff-Mounted Interface Panel
SPTC	Standalone Payload Training Capability
SSP	Space Station Program
SSMTF	Space Station Mockup and Training Facility
SSTF	Space Station Training Facility
STEP	Suitcase Test Environment for Payloads
STFx	Simulator Text Fixture
SUP	Supply
SYNC	Synchronization

TB	Terminal Board
TCS	Thermal Control System
U.S.	United States
UIP	Utility Interface Panel
VAC	Volts Alternating Current
VDC	Volts Direct Current

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PAYLOAD USER DEVELOPMENT GUIDE (PUDG)

FOR THE

SPACE STATION TRAINING FACILITY (SSTF)

PAYLOAD TRAINING CAPABILITY (PTC)

APPENDIX V

PAYLOAD SIMULATOR ENVIRONMENT (PSE)

AND SIMULATOR TEST FIXTURE (STFx) SPECIFICATIONS

CONTRACT NO. NAS9-18181, SCHEDULE C

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50.1 INTRODUCTION

50.1.1 Identification

This document is Appendix V, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) Specification, of SSP-50323, Payload User Development Guide (PUDG) for the Space Station Training Facility (SSTF) Payload Training Capability (PTC). This specification establishes the as-built design, manufacture, performance, and test criteria for Version 3.0 of the PSE/STFx product. The PSE/STFx product was developed by Raytheon Technical Services Company, Aerospace Engineering Services (hereafter referred to as Raytheon).

50.1.2 Purpose

The primary audience for this document is personnel who have responsibilities related to using the PSE/STFx product to provide a Payload Training Simulator (PTS) to be located in the SSTF using the PTC. Those individuals will normally be associated with the Payload Element Developer (PED), the sponsoring National Aeronautics and Space Administration (NASA) Payload Development Center (PDC), or other support groups and contractors. In the PUDG and in this Appendix V, those organizations are collectively known as the Payload Developer (PD).

50.1.3 PSE/STFx System Overview

The PSE is a Personal Computer (PC)-based simulator environment that provides a hardware and software platform to facilitate development of a PTS to be used in the SSTF. It provides support for interfaces between an integrated PTS and the SSTF Full-Task Trainer (FTT), including the PSimNet interface defined in Appendix III and those interfaces defined in SSP-52050, Software Interface Control Document, Part 1, International Standard Payload Rack to International Space Station, that are supported by the SSTF Onboard Computer System (OBCS) software. The PSE is scaleable and flexible enough to provide an assortment of capacity and functional options to prospective payload simulator developers. The PSE is also used as a surrogate PTS to test functional and performance characteristics of the SSTF-to-PTS interfaces.

The STFx provides a hardware and software system that supports testing and verification of the PTS either at the PD location or at the Johnson Space Center (JSC) prior to being integrated into the SSTF. The STFx can also be used to control a Suitcase Test Environment for Payloads (STEP) for interface testing and in conjunction with a PTS to provide a Standalone Payload Training Capability (SPTC). In addition to functioning in separate computer systems, the PSE and STFx software can be used in a combined PSE/STFx computer system.

Figure 50.1-1 shows the components of a PSE and its interfaces. The shaded components are included in the scope of delivery.

Figure 50.1-2 shows the STFx connected to a PTS as it would be to test the PTS or to provide an SPTC configuration for the PTS.

The STEP is described in D683-35458, Critical Item Development Specification for STEP, and D683-35455-1, User's Guide for STEP.

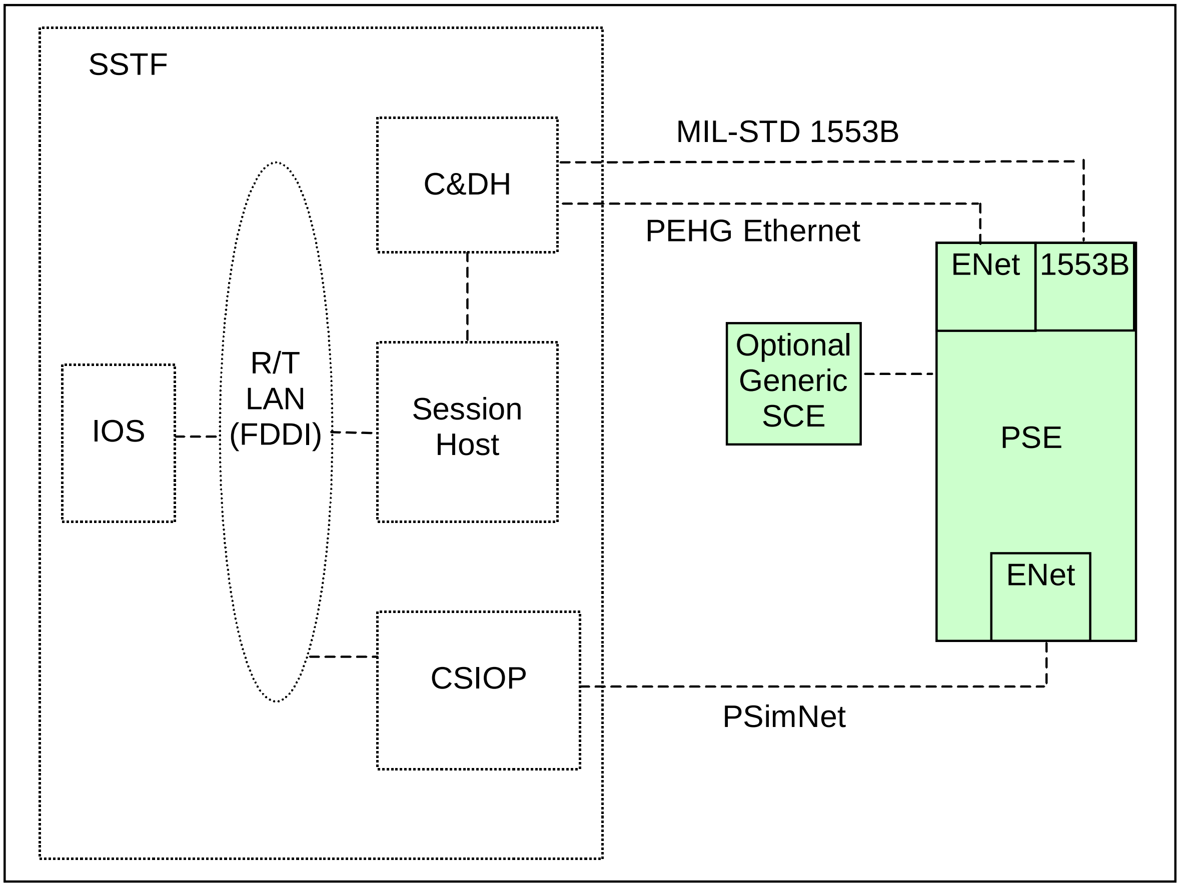

Figure 50.1-1 Payload Simulator Environment (PSE)

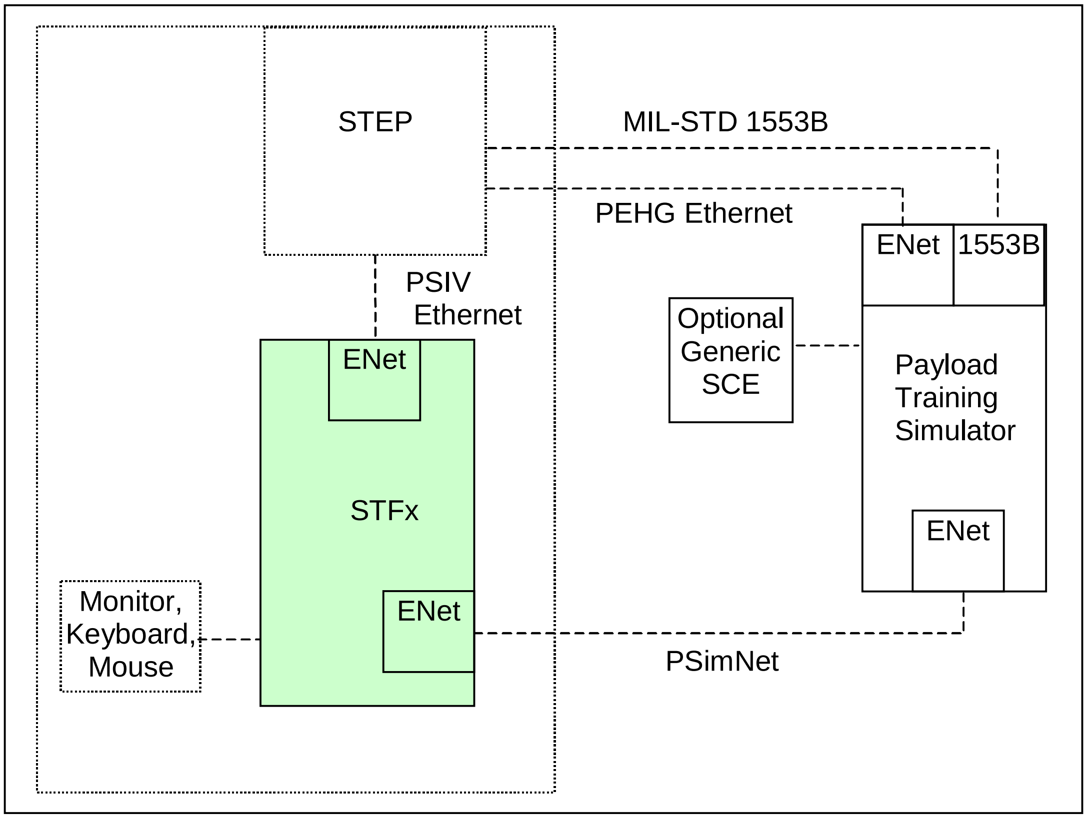

Figure 50.1-2 Simulator Test Fixture (STFx) and SPTC Configuration

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50.2 APPLICABLE DOCUMENTS

The following documents of the exact issue shown are an applicable part of this document to the extent specified herein. Subtier documents referenced in the cited documents are not applicable unless referenced within this document. In the event of conflict between the documents referenced herein and the content of this document, this document shall be considered a superseding document.

D683-35455-1, User's Guide for the Suitcase Test Environment for Payloads (STEP), Revision A, 15 July 1998

D683-35458, Critical Item Development Specification for the Suitcase Test Environment for Payloads (STEP), Revision A, 05 September 1996

Federal Communications Commission (FCC) Rules and Regulations, Part 15: Radio Frequency Devices, Subpart B: Unintentional Radiators, Class A, 24 May 2001

IEEE-STD-802.3-2000, Information Technology – Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks – Specific Requirements, Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, 16 October 2000

MIL-STD-130, Identification Marking of U.S. Military Property, Revision K, 15 January 2000

MIL-STD-1472, Human Engineering, Revision F, 23 August 1999

MIL-STD-1553B, Interface Standard for Digital Time Division, Command/Response Multiplex Data Bus, Revision B, 21 September 1978 (updates to Notice 4, 15 January 1996)

S683-28783, Prime Item Development Specification for the Payload Software Integration and Verification (PSIV) Facility, Revision A, 31 August 1999

SP-M-502, Configuration Item Specification Payload Ethernet Hub/Gateway, Revision C, 10 August 1996

SSP-30312, Electrical, Electronic, and Electromechanical (EEE) and Mechanical Parts Management and Implementation Plan for the Space Station Program, Revision G, 16 June 2000

SSP-30540, Human Computer Interface Guide, Revision A, 07 July 1993

SSP-41175-2, Software Interface Control Document, Part 1: Station Management and Control to International Space Station, Book 2, General Software Interface Requirements, Revision D, 08 June 2000

SSP-52050, Software Interface Control Document, Part 1, International Standard Payload Rack to International Space Station, Revision C, 11 January 2001

SSP-57000, Pressurized Payloads Interface Requirements Document, Revision E, 20 September 2000

SSP-57002, Payload Software Interface Control Document Template, Revision A, 23 October 2000

SSP-58026, Generic Payload Simulator Requirements Document, Volume I, 04 January 2000

SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User's Guide for the Training Systems Contract, 31 March 2000

SST-698, Suitcase Test Environment for Payloads (STEP) Payload Software Integration and Verification (PSIV) to Simulator Test Fixture (STFx) Interface Control Document, To Be Published

50.3 PSE/STFX DESCRIPTION

50.3.1 PSE/STFx Definition

50.3.1.1 PSE/STFx System Overview

The PSE or combined PSE/STFx hardware consists of a computer and optional generic Signal Conversion Equipment (SCE). Typical mounting in a PTS rack is shown in Figure 50.3-1.

The STFx hardware consists of a computer system only.

The PSE/STFx computer, the SCE, and their peripherals are Commercial Off-the-Shelf (COTS) integrated hardware. Their design and manufacturing will not be discussed except in subjects relating to system integration and functional descriptions. This document concentrates mainly on the PSE/STFx software product specification.

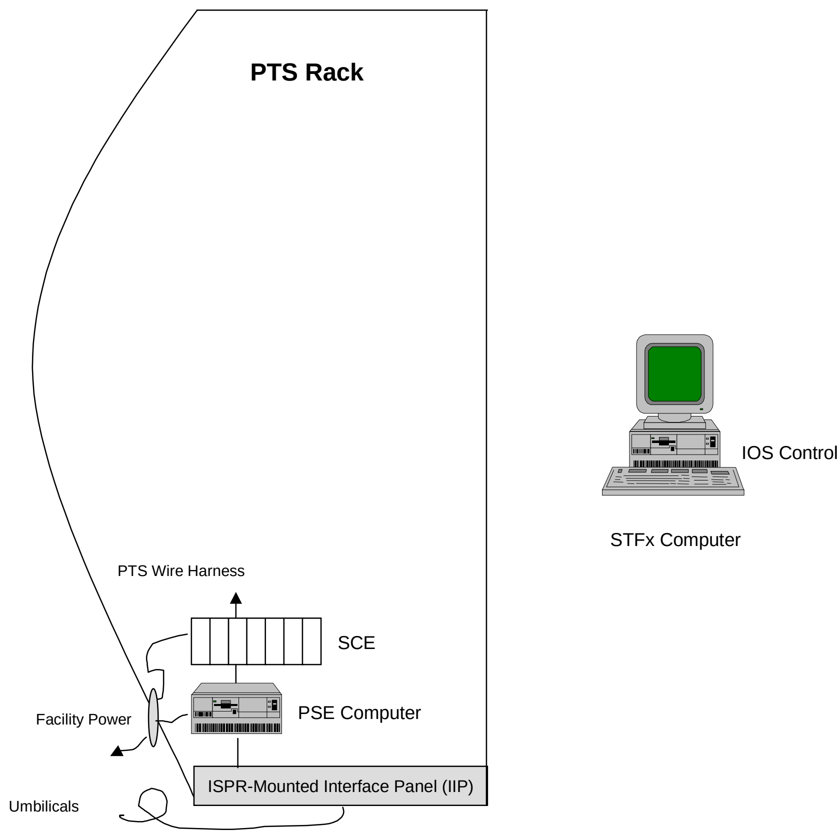

Figure 50.3-1 PSE/STFx Hardware Diagram

The PSE/STFx software is developed on a Microsoft Windows NT platform using the Gensym Corporation G2 product and the Microsoft Visual C++ development studio. The software consists of the following key components as shown shaded in Figure 50.3-2:

a. Executive – controls the timely execution of various tasks for their specific functions.

b. Handlers – manage the communications to external systems via a set of Gateway processes.

c. PTS/STFx database – contains the system and PTS data and performs database management.

d. Payload Training model – provides a development environment for payload simulator model development and its real-time execution. The payload training model can be developed under the G2 environment using the G2 language and/or under the Foreign Function (FF) environment using the C language.

e. STFx Instructor/Operator Station (IOS) – emulates the SSTF IOS.

f. STFx – provides a set of simplified Space Station Core System models, an STFx scripting capability that allows a test procedure or SPTC Instructor action to be automated wherever suitable, and an STFx Timeliner Control Command capability that allows the STFx to emulate issuing of ground commands.

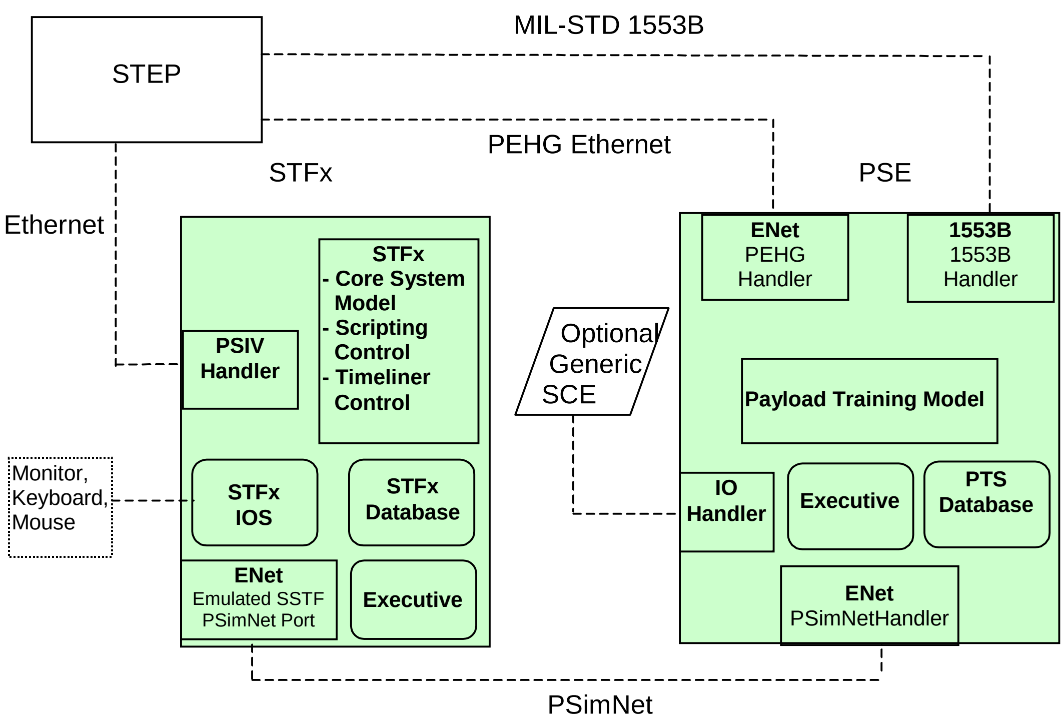

Figure 50.3-2 PSE/STFx Software Diagram

50.3.1.2 Interface Definition

This section provides the PSE/STFx external and internal interface specifications. An external interface is any information transfer required between the PSE/STFx and an external device, such as information transfer along the 1553B, Payload Simulation Network (PSimNet), Payload Ethernet Hub Gateway (PEHG), SCE, and the Payload Software Integration and Verification (PSIV) bus. An internal interface is any information transfer required between the major components within the PSE/STFx, such as data transfer between the PSE PSimNet Handler and the Executive or between the G2 environment and the PSE FF environment. Although PSE and STFx components are contained in a single software G2 Knowledge Base, there is no direct PSE and STFx communication except through the PSimNet interfaces.

The interfaces are described in the following sections and illustrated in Figure 50.3-3 and Figure 50.3-4.

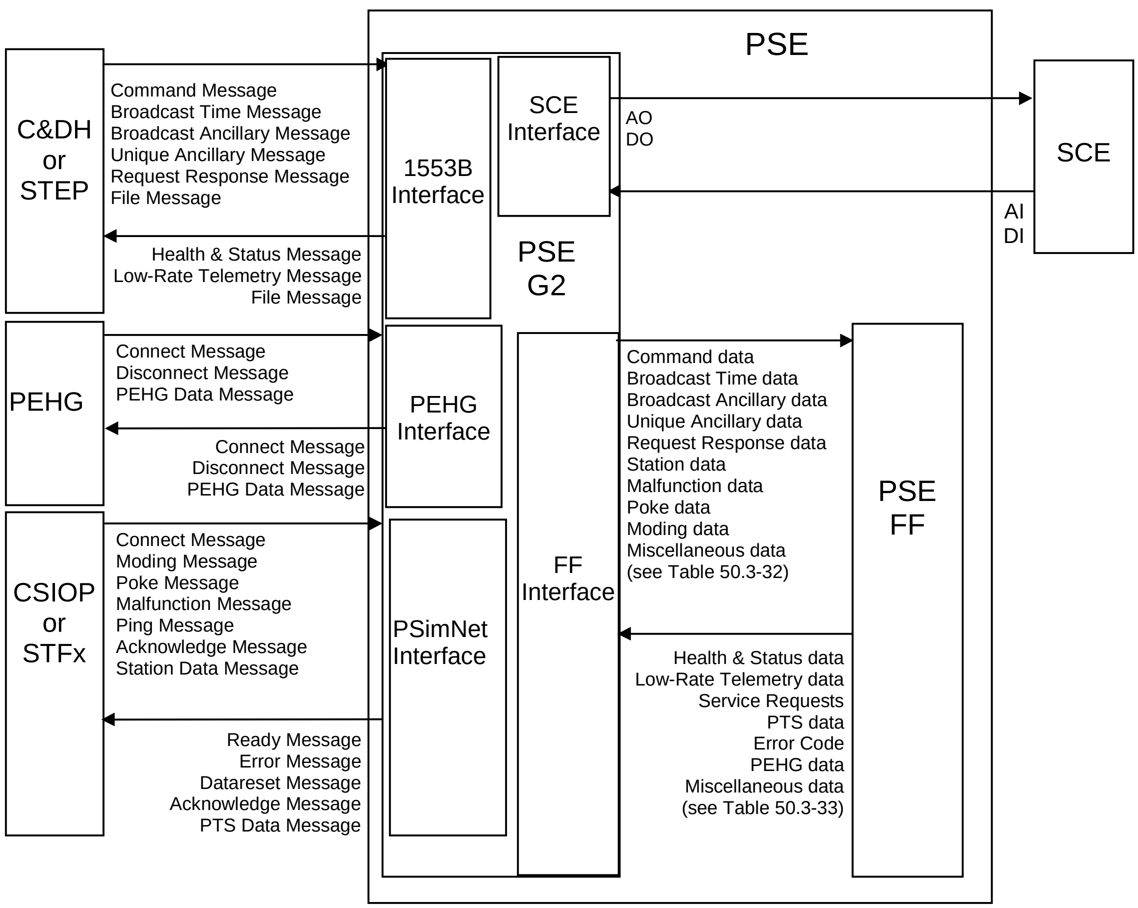

Figure 50.3-3 PSE Interface Diagram

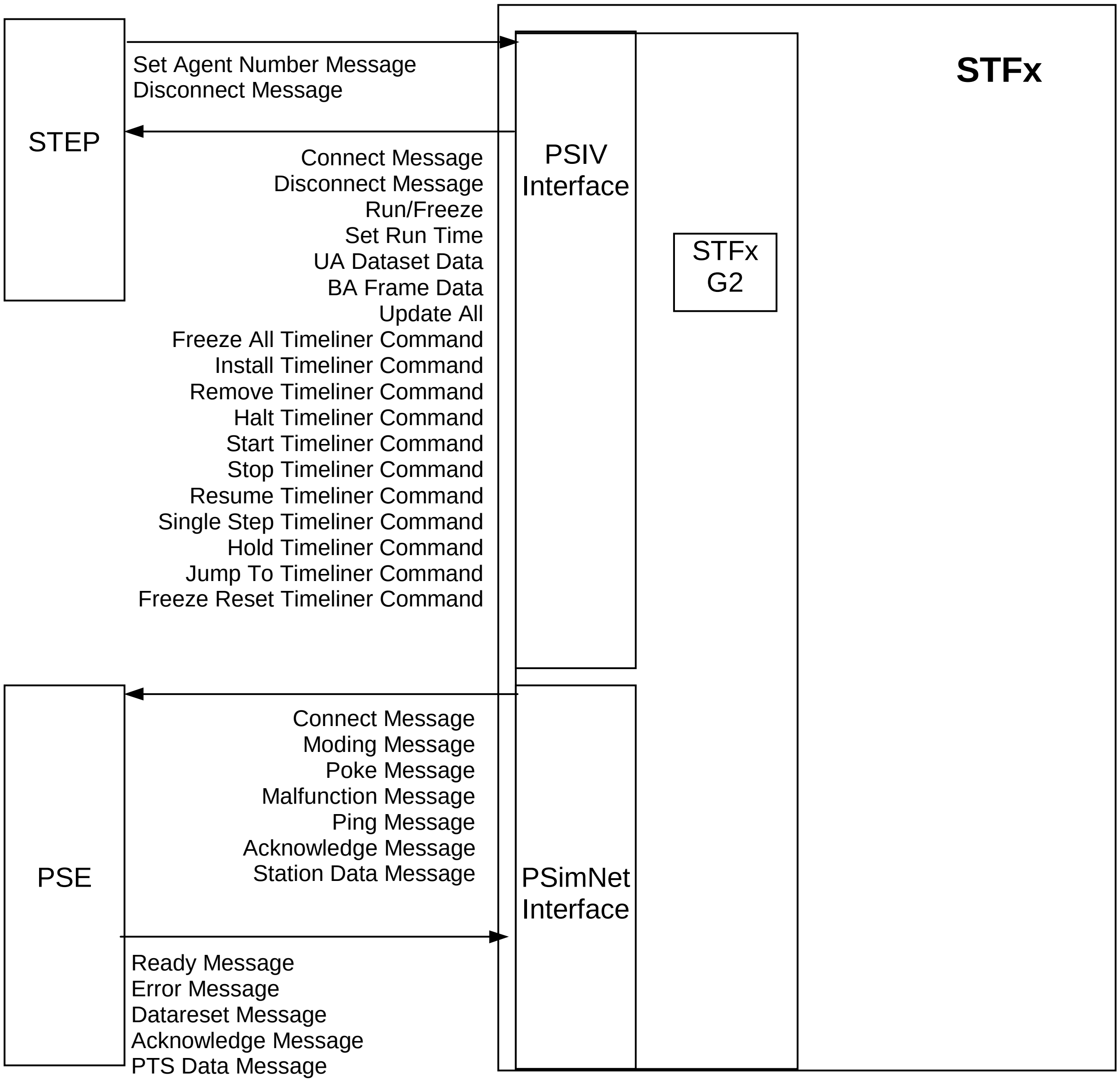

Figure 50.3-4 STFx Interface Diagram

50.3.1.2.1 1553B Interfaces

The 1553B data message transfer uses MIL-STD-1553B protocol. The message includes Consultative Committee for Space Data System (CCSDS) Primary and Secondary headers as defined in SSP-41175, Software Interface Control Document. The message also includes user data as defined in SSP-52050.

a. PSE communicates with the Payload (PL) Multiplexer/Demultiplexer (MDM) (STEP or SSTF Command and Data Handling (C&DH)) via a MIL-STD-1553B bus using the CCSDS message packet format.

b. PSE receives from PL-MDM the Mode Code (MC).

c. PSE receives from PL-MDM the Broadcast Time message.

d. PSE receives from PL-MDM the Broadcast Ancillary Data message.

e. PSE receives from PL-MDM the Unique Ancillary Data message.

f. PSE receives from PL-MDM the Request Response message.

g. PSE receives from PL-MDM the File Transfer Data message.

h. PSE sends to PL-MDM the Health and Status Data message.

i. PSE sends to PL-MDM the Low-Rate Telemetry Data message.

j. PSE sends to PL-MDM the File Transfer Data message.

50.3.1.2.2 PSimNet Interfaces

PSimNet data transfer via Ethernet uses User Datagram Protocol (UDP). A PSimNet message packet includes the PSimNet header and user data block. Both header and user data formats are defined in Appendix III, Section 30.4.2.3.

PSimNet data transfers to and from the PSE function include the following:

a. PSE receives from the Station (Crew Station Input/Output Processor (CSIOP) or STFx) the Broadcast Connect message.

b. PSE receives from the Station the Acknowledge message.

c. PSE receives from the Station the Moding Command message.

d. PSE receives from the Station the Poke Data message.

e. PSE receives from the Station the Malfunction Data message.

f. PSE receives from the Station the Ping message.

g. PSE receives from the Station the Station Data message.

h. PSE sends to the Station the Ready message.

i. PSE sends to the Station the Acknowledge message.

j. PSE sends to the Station the Error message.

k. PSE sends to the Station the Datareset message.

l. PSE sends to the Station five PTS Data messages.

PSimNet data transfers to and from the STFx function include the following:

a. STFx receives from the PTS the Ready message.

b. STFx receives from the PTS the Acknowledge message.

c. STFx receives from the PTS five PTS Data messages.

d. STFx receives from the PTS the Error message.

e. STFx receives from the PTS the Datareset message.

f. STFx sends to the PTS the Broadcast Connect message.

g. STFx sends to the PTS the Moding Command message.

h. STFx sends to the PTS the Station Data message.

i. STFx sends to the PTS the Poke Data message.

j. STFx sends to the PTS the Malfunction Data message.

k. STFx sends to the PTS the Ping message.

l. STFx sends to the PTS the Acknowledge message.

50.3.1.2.3 PEHG Interfaces

PEHG data transfer via Ethernet uses Transmission Control Protocol (TCP). The PEHG data message formats are specified in SSP-52050.

a. PSE receives from the Remote Station the Connect message.

b. PSE receives from the Remote Station the Disconnect message.

c. PSE receives from the Remote Station the PEHG Data message.

d. PSE sends to the Remote Station the Connect message.

e. PSE sends to the Remote Station the Disconnect message.

f. PSE sends to the Remote Station the PEHG Data message.

50.3.1.2.4 PSE SCE Interfaces

SCE data transfer via the National Instruments (NI) PCI-MIO-16E-4 Input/Output (I/O) PC card uses the NI-DAQ proprietary data bus.

a. PSE receives from SCE the Analog Inputs (AIs).

b. PSE receives from SCE the Digital Inputs (DIs).

c. PSE sends to SCE the Analog Outputs (AOs).

d. PSE sends to SCE the Digital Outputs (DOs).

50.3.1.2.5 PSIV Interfaces

PSIV data transfer via the Ethernet uses TCP. The PSIV message format is specified in SST-698, Suitcase Test Environment for Payloads (STEP) Payload Software Integration and Verification (PSIV) to Simulator Test Fixture (STFx) Interface Control Document.

a. STFx receives from STEP the Set Agent Number message.

b. STFx receives from STEP the Disconnect message.

c. STFx sends to STEP the Connect message.

d. STFx sends to STEP the Disconnect message.

e. STFx sends to STEP the Run/Freeze message.

f. STFx sends to STEP the Set Run Time message.

g. STFx sends to STEP the Unique Ancillary (UA) Dataset Data message.

h. STFx sends to STEP the Broadcast Ancillary (BA) Frame Data message.

i. STFx sends to STEP the Update All Background messages.

j. STFx sends to STEP the Freeze All Timeliner command.

k. STFx sends to STEP the Install Timeliner command.

l. STFx sends to STEP the Remove Timeliner command.

m. STFx sends to STEP the Halt Timeliner command.

n. STFx sends to STEP the Start Timeliner command.

o. STFx sends to STEP the Stop Timeliner command.

p. STFx sends to STEP the Resume Timeliner command.

q. STFx sends to STEP the Single Step Timeliner command.

r. STFx sends to STEP the Hold Timeliner command.

s. STFx sends to STEP the Jump To Timeliner command.

t. STFx sends to STEP the Freeze Reset Timeliner command.

50.3.1.2.6 PSE FF Interface

The PSE FF interface transfers data between the G2 environment and the payload training model developed under the PSE FF environment. For a detailed definition of the data transferred via the PSE FF interface, refer to tables 50.3-28, 50.3-29, 50.3-30, 50.3-31, 50.3-32, and 50.3-33 in Section 50.3.3.1.3.4.2.

a. PSE G2 sends to PSE FF the Command data.

b. PSE G2 sends to PSE FF the Broadcast Time data.

c. PSE G2 sends to PSE FF the Broadcast Ancillary data.

d. PSE G2 sends to PSE FF the Unique Ancillary data.

e. PSE G2 sends to PSE FF the Request Response data.

f. PSE G2 sends to PSE FF the Station data.

g. PSE G2 sends to PSE FF the Malfunction data.

h. PSE G2 sends to PSE FF the Poke data.

i. PSE G2 sends to PSE FF the Moding data.

j. PSE G2 sends to PSE FF the Miscellaneous data.

k. PSE G2 receives from PSE FF the Health and Status data.

l. PSE G2 receives from PSE FF the Low-Rate Telemetry data.

m. PSE G2 receives from PSE FF the Service Request data.

n. PSE G2 receives from PSE FF the PTS data.

o. PSE G2 receives from PSE FF the Error Code data.

p. PSE G2 receives from PSE FF the PEHG data.

q. PSE G2 receives from PSE FF the Miscellaneous data.

50.3.1.2.7 Major Component List

The major functional components of the PSE/STFx software are defined as follows:

a. PSE/STFx Executive Software (Section 50.3.3.1.3.1.1)

b. PSE/STFx Database Management (Section 50.3.3.1.3.1.2)

c. PSE 1553B Interfaces (Section 50.3.3.1.3.1.3)

d. PSE PEHG Interfaces (Section 50.3.3.1.3.1.4)

e. PSE/STFx PSimNet Interfaces (Section 50.3.3.1.3.1.5)

f. PSE SCE Interfaces (Section 50.3.3.1.3.1.6)

g. STFx PSIV Interfaces (Section 50.3.3.1.3.1.7)

h. STFx Scripting Capability (Section 50.3.3.1.3.1.8)

i. STFx Timeliner Control Command Capability (Section 50.3.3.1.3.1.9)

j. PSE/STFx Graphical User Interfaces (Section 50.3.3.1.3.2)

k. PTS Deployment Environment (Section 50.3.3.1.3.3)

l. PTS Model Development Environment (Section 50.3.3.1.3.4)

m. STFx Development/Deployment Environment (Section 50.3.3.1.3.5)

50.3.2 Characteristics

50.3.2.1 Performance

The PSE/STFx supports the following three modes of operation when used as a PTS deployment host:

a. PSE Standalone Mode. The PSE hosts payload models and supports payload development and testing without the support of the SSTF or other facilities. In this mode of operation, all control over the simulation applications is provided by the STFx component through local keyboard, mouse, and video monitor interaction.

b. SSTF Integrated Mode. The PSE hosts a payload model and supports payload training when integrated with the SSTF and using full core-system interfaces, C&DH interfaces, and IOS capabilities provided by the SSTF. In this mode of operation, all control over the PSE simulation applications is provided by the SSTF computer system via the CSIOP and the PSimNet through a run-time monitor in the PSE. In this scenario, the PSE video monitor is removed, PSE keyboard or mouse inputs are not allowed, and the STFx component is not active.

c. SPTC (PSE/STFx/STEP) Integrated Mode. The PSE hosts a payload model and supports payload training when integrated with an STFx and STEP, thereby providing both nominal C&DH and core system interfaces and a simple IOS capability. In this mode of operation, a separate STFx hardware/software system provides all control over the simulation applications over the PSimNet through a run-time monitor in the PSE. In this scenario, the PSE video monitor, keyboard, and mouse input are optional.

The PSE also provides a User model development environment that allows the PD to develop a PTS model. The model can be developed under either the PSE G2 or PSE FF environment, which uses a Microsoft Visual C compilable interface.

50.3.2.2 Physical Characteristics

a. The PSE development environment operates in a standalone PC with monitor, keyboard, and mouse. The software can be configured as a combined PSE/STFx station. The STFx component uses the monitor, keyboard, and mouse to provide monitoring and control over the simulation applications in the PSE component. In this scenario, the STFx and PSE communicate through the same Ethernet port without actually leaving the port.

b. The PSE deployment (run time) environment operates in a PC mounted inside the PTS rack without a monitor, keyboard, or mouse. The PSE software loaded with the PTS model is configured to perform the PSE function only. The STFx component is not active in this configuration.

c. In SPTC mode, the PSE is configured as a deployment PC. The PSE is connected to a separate STFx via PSimNet and to STEP via 1553B and PEHG.

d. In SSTF integrated mode, the PSE is configured as a deployment PC. The PSE is connected to the SSTF via PSimNet, 1553B, and PEHG.

50.3.2.3 Reliability

The PSE/STFx computer, the SCE, and their peripherals are COTS hardware. They are designed and integrated according to the best industrial practices to prevent a failure in an active part causing failure of any other part.

The PSE/STFx software is modularized to the maximum extent practical. Failure of software during simulation will not cause damage to program files residing on the disk. System recovery is accomplished by restarting the computer.

A failure in any major hardware or software component may result in a system response that is detrimental to the training in progress. The failed part should be replaced before continuing the operation.

The Mean Time Between Failures (MTBF) value of the COTS hardware is not readily available; however, the hardware does follow commercial equipment standards.

50.3.2.4 Maintainability

The PSE/STFx computer, the SCE, and their peripherals are COTS hardware. Industrial standard practices for PC maintenance should be followed to maintain the operating condition of the PSE hardware. A failing part can be replaced by a part with the same number.

PSE/STFx software is maintained in a separate zip disk and/or CD-ROM. The software is under NASA JSC configuration control except for the following software components that are supplied by the PTS PD:

a. All PL-specific data files in the c:\data directory

b. G2 Knowledge Base c:\gensym\g2\kbs\user-api.kb or the file with the PD-assigned name for that module

c. PD-developed FF C codes in the c:\DevStudio\MyProjects\ff_src directory

d. PD-developed FF C executable ff.exe in the c:\process directory

e. Other PD-developed G2 Knowledge Base, C codes, or C executables

50.3.2.5 Environmental Conditions

a. All PSE/STFx equipment is designed to operate over an ambient facility temperature range from 60° F to 80° F (15.6° C to 26.7° C).

b. All PSE/STFx equipment is designed to operate over an ambient facility relative humidity range from 20 percent to 80 percent, noncondensing.

c. Electrostatic protection is provided for all sensitive computer equipment.

50.3.2.6 Transportability

The PSE/STFx computer is COTS equipment and its transportation and storage is in accordance with vendor specifications.

50.3.3 Design and Construction

50.3.3.1 Materials, Processes, and Parts

The PSE or combined PSE/STFx hardware consists of a computer and optional generic SCE.

The STFx hardware consists of an STFx computer system only.

The PSE/STFx computer, the SCE, and their peripherals are COTS hardware. Their design and manufacturing will not be discussed except for subjects relating to system integration and functional description. The COTS hardware design conforms to standard industrial practices and their usage is to be consistent with their documented design intent. Electrostatic discharge of the PSE computer and SCE equipment is compliant with SSP-30312, Electrical, Electronic, and Electromechanical (EEE) and Mechanical Parts Management and Implementation Plan for the Space Station Program, Appendix B.

The PSE/STFx computer system is a Windows NT-based PC. Hardware and software requirements are specified for each component. In addition to the typical PC peripherals, several special-function COTS devices are required to support PSE interfaces.

50.3.3.1.1 COTS Hardware Components

The as-built PSE/STFx computer is a Windows NT-based PC with Intel Pentium III 450-megahertz dual processors. Because of the rapid advancement of PC technology, performance, and pricing, the as-built specification for the PC may have become or may soon become obsolete. However, any PC that meets the minimal requirement can be used to host the PSE/STFx software. Therefore, the specification in this document addresses only the functional requirement. Table 50.3-1 and Figures 50.3-5 and 50.3-6 show the minimum PC requirements and slot arrangement. They also include the special-function PC cards for PSE/STFx interfaces.

Table 50.3-1 Computer Hardware Components

Component	Comment
Central Processing Unit (CPU) performance rating of 900 MHz	Single or dual processors
Small Computer System Interface (SCSI) Hard Drive	Integrated – 4 GB or higher
RAM	256 MB or higher
CD-ROM	Integrated
Diskette, 3.5 inch	
Zip Drive	Integrated – 100 MB
Video Memory	Integrated – 2 MB or higher
Slots	Industry Standard Architecture (ISA) – 2 and Peripheral Component Interconnect (PCI) – 4
Power and cooling fan	325 watts or higher rating
Keyboard and mouse	
Multichannel (4) Ethernet Adapter	
1553B card with cables	For PSE only

Component	Comment
I/O card with cables	For PSE only

The as-built PSE includes an Adaptec ANA-6944A/TX multichannel Ethernet PCI Adapter server that provides four independent Ethernet connectors. The four Ethernet ports are used for different connections. A PSE requires three ports, one for PSimNet, one for PEHG-1, and one for PEHG-2. An STFx requires two ports, one for PSimNet and one for a connection to a STEP. A different multichannel Ethernet Adapter server could be used for PSE software since the driver is transparent to the user.

An SBS Technologies, Inc. (SBS) Advanced Bus Interface/Advanced Single Function (ABI/ASF) PC3 card is used in the PSE to provide a MIL-STD-1553B interface. A set of 1553B terminators and cables are also included. Since the PSE software uses the SBS driver library, this particular hardware and the version of its driver library cannot be changed. If a system is to be used only as an STFx, this card is not required.

The SCE uses an I/O controller, the National Instruments NI PCI-MIO-16E-4 circuit card, for a PCI bus interface connection. This card includes a bus master capability that makes multitasked data acquisition applications possible. Bus mastering manages the direct transfer of data between the plug-in board and the computer memory without burdening the CPU. The PSE includes the NI-DAQ driver library for the SCE Gateway process. However, other SCE hardware and software may be used provided that a compatible driver library is available. If a system is to be used only as an STFx, this card is not required.

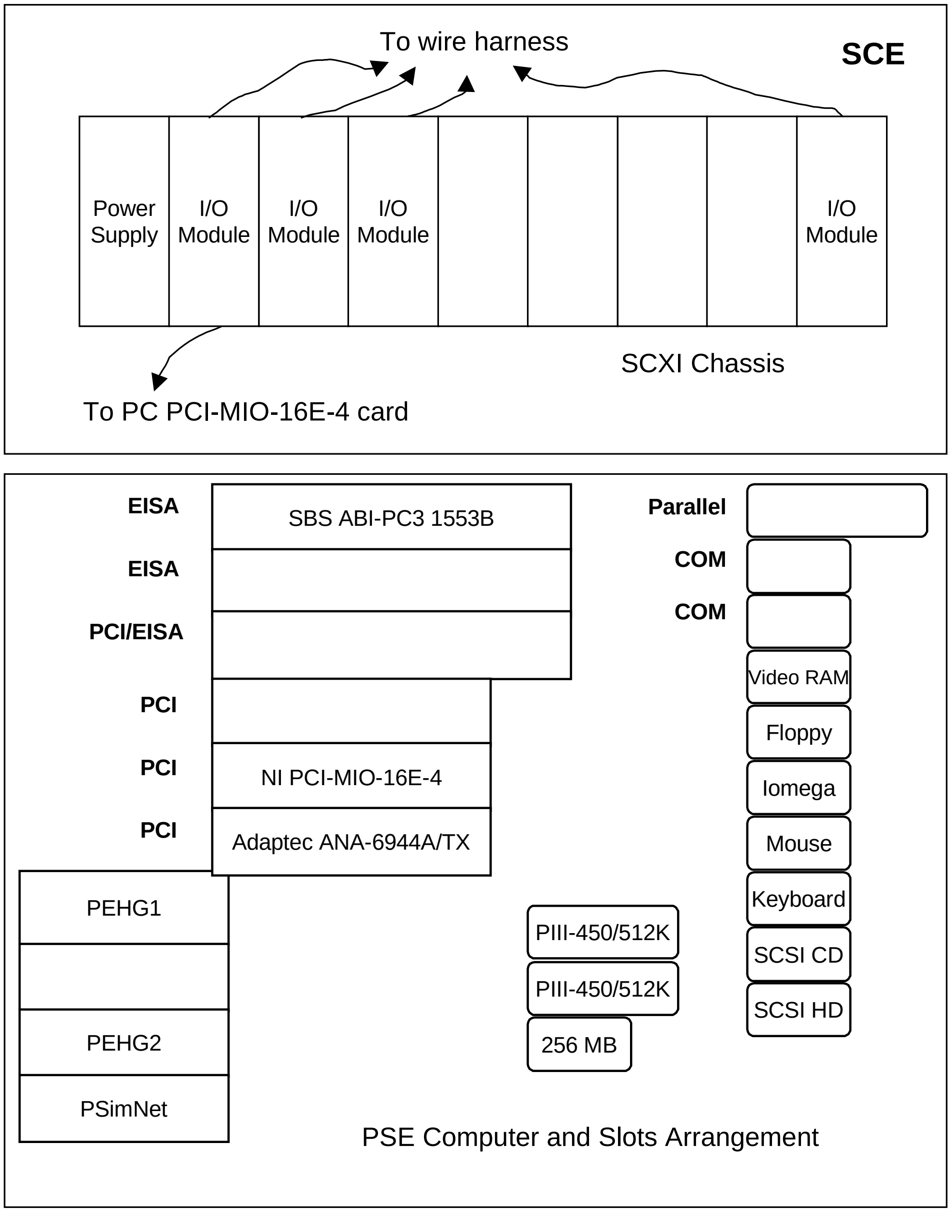

Figure 50.3-5 PSE Computer Configuration Diagram

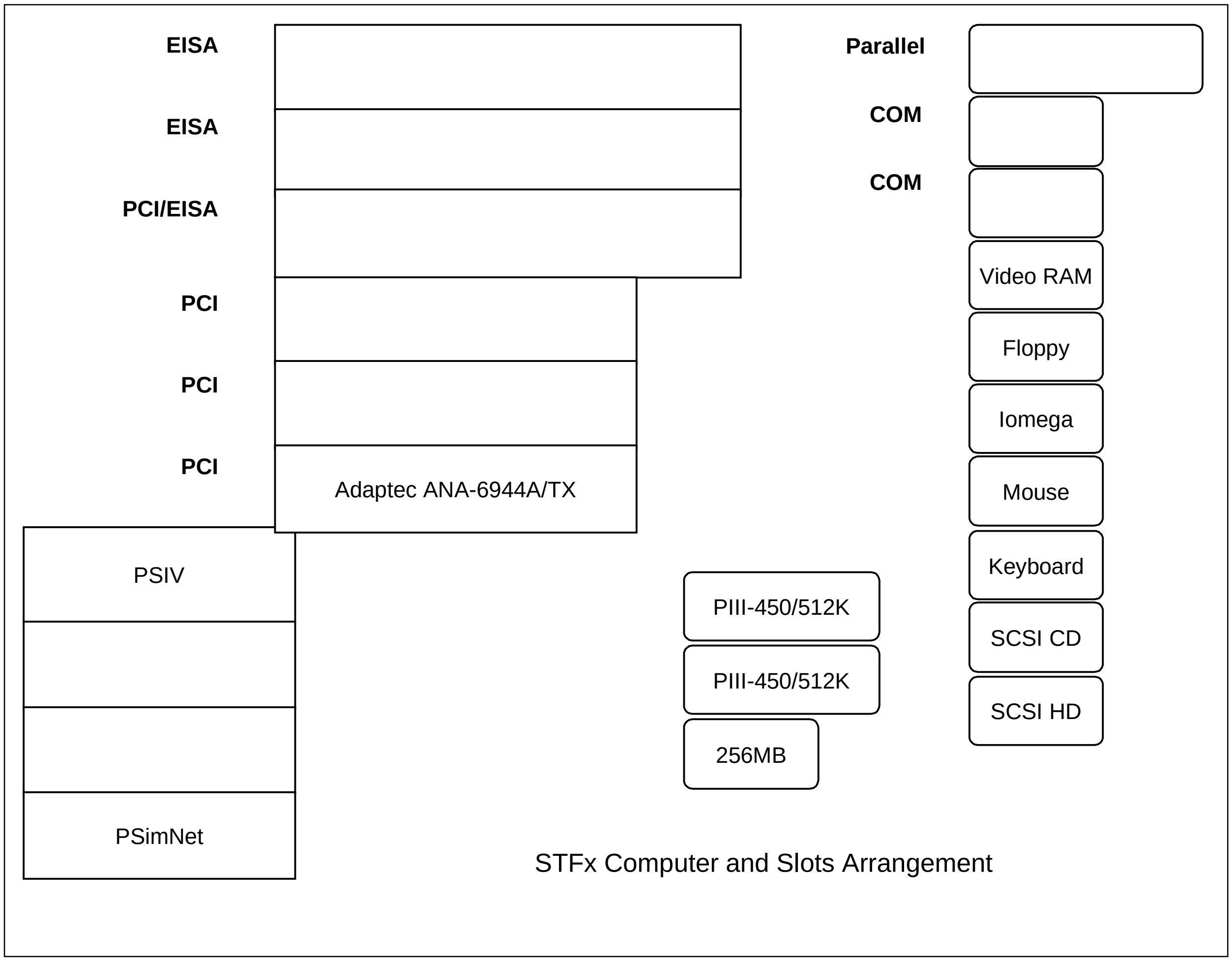

Figure 50.3-6 STFx Computer Configuration Diagram

SCE analog and digital I/O modules can be included in a separate 19-inch rack-mountable I/O chassis (SCXI) as shown in Figure 50.3-5. The standard SCE components are shown in Table 50.3-2. Additional I/O modules can be installed if required; however, additional software will be required for modules other than the types listed in Table 50.3-2.

Table 50.3-2 SCE I/O Parts List

Description	Part No.
SCXI-1001 12-Slot Chassis (120 VAC, 60 Hz)	776571-01
SCXI-1370 Rack Mount Kits	776577-70
PCI-MIO-16E-4 Circuit Card for the PC PCI bus interface connection (installed in PC)	777305-01
SCXI-1349 Data Cable (2 m)	776574-40
SCXI-1100 32-Channel AI Module mounted in SCXI Chassis	776572-00
SCXI-1300 Connector Block for AI Module	776573-00

Description	Part No.
SCXI-1124 6-Channel AO Module mounted in SCXI Chassis	776572-24
SCXI-1325 Connector Block for AO Module	776573-25
SCXI-1162 32-Channel DI Module mounted in SCXI Chassis	776572-62
SCXI-1326 Connector Block for DI Module	776573-26
SCXI-1163 32-Channel DO Module mounted in SCXI Chassis	776572-63
SCXI-1326 Connector Block for DO Module	776573-26
SCXI-1180 Feedthrough Panel mounted in SCXI Chassis	776572-01
SCXI-1302 Connector Block for Feedthrough Panel	776573-02

50.3.3.1.2 COTS Software

The COTS software for a combined PSE/STFx is listed Table 50.3-3. The specific version provided with a PSE/STFx system will be listed on the documentation provided at the time of delivery.

The computer operating system is Microsoft Windows NT. Each PC is loaded with Microsoft Office and McAfee VirusScan. A Microsoft Visual C++ development kit is provided for the PSE.

The PSE/STFx software development system uses the Gensym Corporation G2 product. G2 is a multiplatform system that runs on both UNIX and Wintel machines. The Knowledge Base is 100-percent portable to most of the well-known Reduced Instruction Set Computer (RISC) workstations and the Intel and Alpha PCs. One G2 Development license key will be provided to each PD for use restricted to developing the PTS software in the PSE. A G2 deployment license key will be included for additional PSEs provided to a PD and will be used for operational PSEs and STFxs.

Parts of the PSE/STFx software are developed using the Microsoft Visual C++ language.

Table 50.3-3 PSE/STFx Computer COTS Software List and Usage

Component	Usage	Vendor	As-Built Version
Microsoft NT	Operating System	Microsoft	Version 4 Service Pack 4
Microsoft Office	Data Symbol Dictionary management	Microsoft	MS Office 97
Microsoft Visual C++	Gateway processes development	Microsoft	Version 6.0
McAfee Virus Scan	COMPUTER SECURITY	McAfee	Version 5.0

Component	Usage	Vendor	As-Built Version
G2 Development License	GUI and application software development	Gensym	Version 5.1, Revision 3
G2 Deployment License	Run-time execution of G2 Knowledge Base	Gensym	Version 5.1, Revision 3
ABI/ASF-PC3 1553 Driver Library	External 1553B interfaces	SBS	Version 5.1
Adaptec MultiChannel Ethernet Driver	External Ethernet driver	Adaptec	Driver Version 3.0
NI-DAQ Driver Library for NT	SCE I/O interfaces	NI	Version 6.51

50.3.3.1.3 PSE/STFx Software

The PSE/STFx software is executed in a Windows NT-based PC. The PSE/STFx software can be configured to behave as a PSE, an STFx, or a combined PSE/STFx station that provides both PSE and STFx functions in one PC. This combined PSE/STFx station is most convenient for PTS development and testing. The PSE/STFx uses a set of user-defined configuration files to configure the system as desired. Refer to SST-646, Payload Simulator Environment (PSE) and Simulator Test Fixture (STFx) User's Guide for the Training Systems Contract (Part I and Part IV), for system configurations.

The PSE/STFx software consists of a set of G2 Knowledge Bases (with file extension .kb) and G2 Gateway processes (with file extension .exe). The Knowledge Bases are developed on the G2 platform (refer to SST-646, Part I). The Gateway processes are developed using Microsoft Visual C++ (refer to SST-646, Part I and Part II).

The PD PTS model can be developed under the PSE G2 environment (refer to SST-646, Part I and Part V) and/or the G2 FF environment (refer to SST-646, Part I and Part III). Programs for models developed under the PSE G2 environment are required to be written in the G2 language, while models developed under the PSE FF environment can be written in the C or C++ languages.

The PSE/STFx software consists of two G2 software Knowledge Bases and a set of Gateway processes to interface with external systems as shown in Figure 50.3-7.

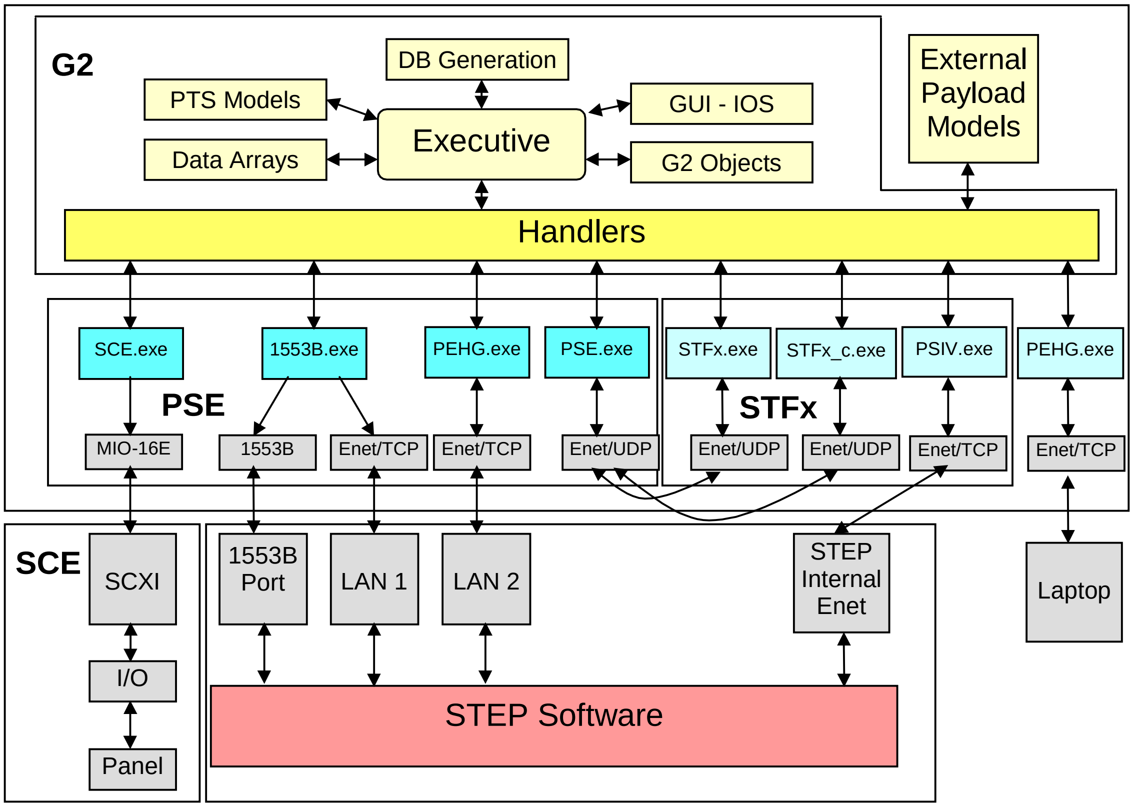

Figure 50.3-7   PSE Software Organization Diagram

The G2 programs include one module under NASA JSC configuration control, pse.kb, and one user application module, user-api.kb. Their functions are as follows:

a. The Executive controls the timely execution of various tasks for their specific functions.

b. Handlers manage the communications via Remote Procedure Call (RPC) to the Gateway processes.

c. The Database Generation (DBG) program converts the entries in the Data Symbol Dictionary (DSD), the NI-DAQ configuration file, and/or the MDM flight data files into a set of G2 data objects and Gateway data arrays. Data arrays are images of the data buffer residing in external systems.

d. The Graphical User Interface (GUI) on the IOS provides the Man-Machine Interface (MMI) to control moding, commands, and messages as well as to monitor the progress and status of PTS software.

e. All the above components except the database are contained in a single configuration-controlled Knowledge Base, pse.kb.

f. PTS models provide the PSE G2 environment for payload simulator model development and real-time execution. The module is named user-api.kb and includes the user database as described in item c.

Gateway processes are individual Windows NT tasks written in the C++ language. They are launched automatically by G2 based on configuration file settings and form the Gateways between the G2 software and the external systems.

There are eight Gateway processes maintained under NASA JSC configuration control and a PD-controlled External PTS model process:

a. SCE.exe is the Gateway process for communicating to the SCE and associated I/O devices.

b. 1553B.exe consists of two components: one manages the communication to the MDM C&DH and the other is the Gateway to the PEHG Local Area Network 1 (LAN-1).

c. PEHG.exe is the Gateway to PEHG LAN-2.

d. PSE.exe is the PTS side of the PSimNet. It is the Gateway to the STFx or SSTF.

e. STFx.exe is the SSTF side of the PSimNet. It emulates the SSTF CSIOP and IOS. There are two copies of STFx.exe, one brought up using configuration file stf_c.cfg and the other using stf.cfg. The former is the broadcast Gateway that issues the PSimNet Connect message. The latter is for message and data exchange.

f. PSIV.exe is the Gateway that links the STFx to STEP via Ethernet using PSIV protocol.

g. A second PEHG.exe is the Gateway to the PTS laptop.

h. External PTS models, including FF.exe and associated C files, provide the G2 FF environment to link user models written in C or C++.

These Gateway processes may reside separately in the STFx or PSE. They may also reside together in a combined PSE/STFx station depending on the configuration file settings.

The following sections address the PSE/STFx interfaces and the design approach of key components. This document concentrates on PSE/STFx functionality. The PSE/STFx User's Guide (SST-646) provides detailed system design, utilization, and operation. A summary of the Table of Contents of SST-646 is listed in Table 50.3-4. The notation *I-5.1* refers to SST-646, Part I, Section 5.1, etc.

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50.3.3.1.3.1 PSE/STFx Component Design

50.3.3.1.3.1.1 PSE/STFx Executive Software

The PSE/STFx Executive software performs the following functions:

a. The Executive software uses c:\data\configuration\station-id.cfg to configure the system for PSE, STFx, or Combined modes of operation and to identify active Gateway processes.

b. The PSE software uses c:\data\configuration\1553b.cfg to configure 1553B communication characteristics.

c. The PSE software uses c:\data\configuration\pehg.cfg to configure PEHG communication characteristics.

d. The PSE software uses c:\data\configuration\pse.cfg to configure PSimNet communication characteristics for the PSE component.

e. The STFx software uses c:\data\configuration\stf.cfg and \stc_c.cfg to configure PSimNet communication characteristics for the STFx component.

f. The PSE software uses c:\data\configuration\sce.cfg to configure SCE communication characteristics.

g. The STFx software uses c:\data\configuration\psiv.cfg to configure STEP communication characteristics.

h. The Executive software schedules synchronous tasks at 10-, 5-, and 1-hertz rates and manages all asynchronous tasks.

i. The STFx software performs PSimNet Moding management to initiate the Station to PTS Moding commands.

j. The PSE software performs Moding management in response to the Station Moding commands.

k. The Executive software manages the DBG facility for PTS development as described in Section 50.3.3.1.3.1.2.

l. The PSE software manages 1553B communication between the PSE G2 and PSE Gateway 1553b.exe as described in Section 50.3.3.1.3.1.3.

m. The PSE software manages PEHG communication between PSE G2 and PSE Gateway pehg.exe as described in Section 50.3.3.1.3.1.4.

n. The Executive software manages PSimNet communication between the PSE/STFx G2 and the PSE/STFx Gateway pse.exe as described in Section 50.3.3.1.3.1.5.

o. The PSE software manages SCE communication between the PSE G2 and PSE Gateway sce.exe as described in Section 50.3.3.1.3.1.6.

p. The STFx software manages PSIV communication between the STFx G2 and STFx Gateway psiv.exe as described in Section 50.3.3.1.3.1.7.

q. The STFx software manages the scripting generation and execution as described in Section 50.3.3.1.3.1.8.

r. The PSE software manages all PSE GUIs as described in Section 50.3.3.1.3.2.

s. The PSE software manages all scheduling of PD-developed user application tasks as described in Section 50.3.3.1.3.4.3.

t. The PSE software manages data transfer between the PSE G2 environment and the PSE FF environment as described in Section 50.3.3.1.3.4.4.

50.3.3.1.3.1.2 Database Management

The PSE/STFx provides a database-driven simulator development and run-time environment.

a. All interface data are stored or held in data buffers as defined in Section 50.3.3.1.3.4.2 (refer to SST-646, Part I, Section 6, for detailed buffer structures).

b. The mapping of data items between the external system definition and the PSE/STFx definition is performed via a DBG program based on the DSD layout. The DSD output file is in a comma-delimited (csv) text file. The PSE/STFx uses Microsoft Excel to create and manage the DSD.

c. Each interface data block is laid out on a corresponding sheet in the c:\data\data\database.xls file (refer to SST-646, Part I, Section 6 for details). The user assigns a unique symbolic name for each entry in the data block. Contained in each entry are the attributes that describe that data item, such as location within the data block, data block class name, transfer rate, etc.

d. Some of the interface data blocks have a predefined data block size and attributes and some may have a user-defined block size. In any case, the layout on the sheet defines the data transfer placeholder and tells the PSE/STFx Gateway process how to process and transfer the data block.

e. After database generation, the PSE G2 Knowledge Bases must be saved to make the change permanent. After the save, both G2 and Gateway processes have to be re-launched to have the new database in effect.

f. The new G2 Knowledge Base and data files in the c:\data\data directory need to be ported to the partner station. If DBG is done at the PSE, the STFx is the partner station, and vice versa.

g. The directory c:\data contains all user-defined data files, configuration files, and PSE/STFx software-generated files. This directory is not under configuration control. It is unique for each PTS.

50.3.3.1.3.1.3 1553B Interfaces

1553B data transfer follows the MIL-STD-1553B protocol. An MDM message packet consists of a CCSDS header and a block of user data sent in 32-word (2 bytes) 1553B messages. The CCSDS primary header (3 words) and secondary header (5 words) formats are defined in SSP-41175. The user data formats are defined in SSP-52050.

a. The PSE communicates to PL-MDM (STEP or SSTF C&DH) via MIL-STD-1553B bus using the CCSDS message packet format.

b. The PSE receives from PL-MDM the MIL-STD 1553B Mode Code at 100-millisecond intervals. The frame count in the MC message defines the PSE frame. The frame ranges from 0 to 99. This frame count becomes the master clock for the PSE.

c. The PSE receives from PL-MDM the Broadcast Time message once each second at frame X0, where X = 0, 1 . . . 9.

d. The PSE receives from PL-MDM the BA Data message at 100-millisecond intervals. BA data is organized according to frame. Each BA Data message consists of 64 words. The 56 words of user data are partitioned into 36 words of high-rate (1 hertz) data and 20 words of low-rate (0.1 hertz) data.

e. The PSE receives from PL-MDM the UA Data message. Each UA Data message consists of 32 words. UA data is defined by a data set Identification (ID) that ranges from 1 to 100. The PSE treats them as frame data with frame = data set ID minus one. Each UA data set has 23 data words with a predefined data rate of 1 hertz (high rate) or 0.1 hertz (low rate). The one word between header and user data defines the UA data set ID.

f. The PSE receives from PL-MDM the Request Response message in response to a PSE Service Request or, if initiated by PL-MDM, during file transfer. The Request Response has a unique message format that consists of 8 words of header, 4 words of data, and a 1-word checksum.

g. The PSE receives from PL-MDM the File Transfer Data message in response to a File Transfer Service Request from the PSE. File data is transferred in 256-word blocks that are enclosed in nine separate 32-word messages (288 words). The transfer is performed with a new block of nine 32-word messages every 100 milliseconds until the file transfer is completed. In case of a block count mismatch or checksum error, the PSE sends a Service Request to PL-MDM to restart from a given data block.

h. The PSE sends to PL-MDM the Health and Status (H&S) Data message. The H&S Data message has a predefined data size and data rate of 1 hertz (high rate) or 0.1 hertz (low rate). The maximum message size is 1280 words. The H&S Data message consists of 8 CCSDS words, 4 Service Request words, 1 sequence counter, and a maximum 1267 words of user data. The H&S Data message always starts at frame 0 of the 10 frames in each second with contiguous 128-word increments per frame until the end of the message.

i. The PSE sends to PL-MDM the Low-Rate Telemetry (LRT) Data message. The LRT Data message has a predefined data rate of 1 hertz or 0.1 hertz. The maximum data size is 640 words, which includes 8 CCSDS header words. The PSE sends LRT data at frame = data set number minus one.

j. The PSE places the first File Transfer Write data block on the data bus at frame 7 of the 10 frames in each second (empirically obtained to synchronize with the STEP) after sending the File Transfer Write Service Request at frame 0 in the second. After that, data are placed one block per frame until the end of the file. When the PSE receives from PL-MDM the Request Response to restart from a given data block, it restarts from that data block. At the end of the file transfer, PL-MDM responds with a Request Response message indicating file transfer failure or success.

50.3.3.1.3.1.4 PEHG Interfaces

PEHG data transfer via Ethernet uses the TCP protocol. A PEHG Data message packet consists of 1280 bytes. The PEHG Data message format is specified in SSP-52050.

a. The PSE responds to a Connect message and establishes the connection with the remote station. Internet Protocol (IP) addresses for both the remote station and the PSE must be defined in the PEHG configuration file c:\data\configuration\pehg.cfg.

b. The PSE receives a Disconnect message from the remote station to disconnect the linkage and return the PSE to the ready state for the next Connect message.

c. The PSE receives the PEHG data block asynchronously. The user defines the data block size in PSE DSD c:\data\data\database.xls sheets PEHG1in or PEHG2in.

d. The PSE initiates a Connect message to the remote station. IP addresses for both the remote station and PSE must be defined in PEHG configuration file c:\data\configuration\pehg.cfg.

e. The PSE initiates a Disconnect message to the remote station to disconnect the linkage. The PSE returns to the ready state for the next connect action.

f. The PSE sends the PEHG data block asynchronously. The user defines the data block size in PSE DSD c:\data\data\database.xls sheets PEHG1ot or PEHG2ot.

50.3.3.1.3.1.5 PSimNet Interfaces

PSimNet data transfer via Ethernet uses the UDP protocol. A PSimNet message packet consists of a PSimNet header (12 bytes) and a user data block. Both header and user data formats are defined in Appendix III, Section 30.4.2.3.

a. The PSE receives the Broadcast Connect message from the Station (CSIOP or STFx). The PSE obtains the return IP address from the Connect message and returns the PTS Ready message to the Station when the PSE is in Ready mode.

b. Every PSimNet message requires an Acknowledge message to complete the message transaction.

c. The PSE receives the Moding command through a set of Simulation Control and Acknowledge messages. The Moding commands consist of Initialization (initialize to the new Initial Condition (IC) point), Datastore (record a Datastore point), Run, Freeze, Safestore (record a Safestore point), Return to Safestore (return to the associated IC point, the update with selected Safestore data), Hold (suspend real-time execution), and Terminate. All Moding commands are executed at the beginning of MDM frame 00 or at the end of frame 99. Therefore, there may be a 0- to 10-second delay between command initiation and command execution.

d. The PSE receives the Poke message when a Poke data value is selected and entered. The PSE receives the complete Poke data block even if only one Poke data value is entered.

e. The PSE receives the Malfunction message when a Malfunction activation status or value is changed. The PSE receives the complete Simple Malfunction data block whenever the activation status of one or more Simple Malfunctions is changed. The PSE receives the complete P1 Malfunction data block whenever the activation status or a data value for any one or more P1 Malfunction is changed. The PSE receives the complete P2 Malfunction data block whenever the activation status or a data value for any one or more P2 Malfunction is changed. Both the P1 and P2 Malfunctions have an activation flag in addition to the values of P1-error, P2-scale, and P2-bias.

f. The PSE receives the Ping message and returns an Acknowledge message that tells the Station this PSE is alive.

g. The PSE receives a Station Data block once each second that provides all Station resources information.

h. The PSE sends one or more Acknowledge messages(s) to the Station after receiving a Station message.

i. The PSE sends an Error message to the Station when an error condition exists in the PSE.

j. The PSE sends a Datareset message to the Station to initialize Station Poke data during Initialization and/or Return to Safestore moding.

k. The PSE sends five PTS data blocks (format 1 to 5) to the Station. All PTS data blocks are required at the Station once each second. The PSE sends one block at a time at 200-millisecond intervals. This time interval corresponds to the PSE frame that ranges from 0 to 4. PSE frame 0 is always synchronized with MDM frame 00.

l. In the SPTC mode, to provide a more flexible association between a PSE and STFx, the PSE provides the malfunction status recorded in the Datastore to the STFx during IC reset.

50.3.3.1.3.1.6 SCE Interfaces

When the optional SCE interface is active, the PSE sends AO and DO to the SCE at a 5-hertz rate. It also polls AI and DI on its return trip.

a. All inputs and outputs are configured using the NI-DAQ channel configuration utility.

b. During the PSE DBG process, the NI-DAQ configuration file is read to create the matching database within the PSE G2 environment. Each I/O point is addressable within the PSE by a symbolic name.

c. When in the SPTC configuration, the Panel I/O status recorded in Datastore will be used by the PSE to perform Panel Switch Verification (PSV). Mismatching I/O will be displayed at the STFx. The Instructor can issue a Panel Switch Overwrite command to bypass the verification. This action is skipped in the SSTF configuration.

50.3.3.1.3.1.7 PSIV Interfaces

50.3.3.1.3.1.7.1 PSIV Protocol

The STEP and the STFx use the PSIV protocol for message passing via Ethernet. The PSIV protocol uses a client/server communication scheme with unique packet formats and communication negotiations. The PSIV protocol defines how two or more subsystems interact when communicating.

The PSIV protocol uses a packet format as defined in Figure 50.3-8. The PSIV protocol header is comprised of a 40-byte header and a data field of variable length depending on the command being sent.

31	16 0
Sync	
Packet Type	
Destination Agent	Destination Task
Source Agent	Source Task
Command	
Time of Origin 1	
Time of Origin 2	
Checksum	
Sequence Number	
Length	
Data Field	

Figure 50.3-8 PSIV Message Packet

Table 50.3-5 provides a description of each field of the PSIV header with specific contents applicable for STEP-STFx interfaces.

Table 50.3-5 PSIV Message Field Descriptions

Header Field	Description	Content
Sync	Pattern used by the destination agent to ensure packet synchronization. If a problem occurs, a standard synchronization algorithm may be implemented by the destination task to try and synchronize incoming packets.	= X”B055CODE”

Header Field	Description	Content
Packet Type	Type of packet being sent, allows for implementation of different packet types	= 1
Destination Agent	The receiving agent for the command	Agent number if STEP-to-STFx command
Destination Task	The receiving task for the command that the destination agent is serving	= 13 if STFx-to-STEP command
Source Agent	The origination source agent (or client) of the command within the source host	Agent Number if STFx-to-STEP command
Source Task	The task number of the command originated from within the source host	Unused
Command	The command number for the destination agent or destination task	X'HHHH' as defined below
Time of Origin 1	32-bit Most Significant Word (MSW) location for origin time of the command	Unused or filled with local time
Time of Origin 2	32-bit Least Significant Word (LSW) location for origin time of the command	Unused or filled with local time
Checksum	Sum of bytes in data field only	Based on data length in multiples of 4
Sequence Number	A sequence number supplied by the source task to ensure proper packet order/processing and error handling responses	Unused
Length	Number of bytes in the data field not including the PSIV header	= Multiples of 4

50.3.3.1.3.1.7.2 PSIV-STFx Communication

The method of establishing communication between the STFx and the STEP using the PSIV protocol is as follows. STEP PSIV packets are exchanged via Ethernet using TCP. The IP address of the STEP is 120.158.28.235, subnet mask 255.0.0.0 with port number 5150. The IP address of the STFx is 120.158.28.N, subnet mask 255.0.0.0 with port number 8000. In the STFx IP address, N is an ID assigned to the STFx and can be any number between 0 and 255, excluding 235.

a. Use of the STEP broadcast (Request Subsystem Information) command and returned (Subsystem Information Response) response is not necessary because the IP address and port number of the STEP PSIV connection is previously known by the STFx.

b. The STFx issues a standard ‘socket connect’ to the STEP to establish a connection.

c. The STEP sends a Set Agent Number command to the STFx notifying the STFx of the Agent Number it has been assigned. The message format is as follows.

PSIV Header with Command = X’0320’	
<Reserved>	Agent Number

d. After establishing a connection, messages from the STFx use the received agent number as the Source Agent in subsequent PSIV message headers. Messages consist of a PSIV header with an appended data area as defined below. The data area length is in increments of 4 bytes (padded, if necessary) to facilitate byte/word swapping between the STFx and the STEP. Once a PSIV communications link is established, all messages are initiated from the STFx. No command response from the STEP is required. No error checking is required, except for verification of PSIV header values.

e. When the connection is no longer required, either the STFx or the STEP may send a Disconnect Socket command to the other party. The message format is as follows:

PSIV Header with Command = X’032A’
<No data>

50.3.3.1.3.1.7.3 Interface Commands

The following commands are exchanged between the STFx and STEP using the PSIV protocol. Refer to SST-646, Part II, Section 5.3, for details.

a. STFx receives from STEP the Set Agent Number message.

b. STFx receives from STEP the Disconnect message.

c. STFx sends to STEP the Connect message.

d. STFx sends to STEP the Disconnect message.

e. STFx sends to STEP the Run/Freeze message. This sets the STEP to Resume/Pause mode.

f. STFx sends to STEP the Set Run Time message. This sets the STEP Simulated Greenwich Mean Time (GMT), or simply the STEP GMT.

g. STFx sends to STEP the UA Dataset Data message. This is used to dynamically change the UA data value using the PTS model created in the STFx.

h. STFx sends to STEP the BA Frame Data message. This is used to dynamically change the BA data value using the PTS model created in the STFx.

i. STFx sends to STEP the Update All Background messages. This is used for Return to Datastore to reset STEP data during IC reset.

j. STFx sends to STEP the Freeze All Timeliner command.

k. STFx sends to STEP the Install Timeliner command.

l. STFx sends to STEP the Remove Timeliner command.

m. STFx sends to STEP the Halt Timeliner command.

n. STFx sends to STEP the Start Timeliner command.

o. STFx sends to STEP the Stop Timeliner command.

p. STFx sends to STEP the Resume Timeliner command.

q. STFx sends to STEP the Single Step Timeliner command.

r. STFx sends to STEP the Hold Timeliner command.

s. STFx sends to STEP the Jump To Timeliner command.

t. STFx sends to STEP the Freeze Reset Timeliner command.

50.3.3.1.3.1.8 STFx Scripting Capability

Message script is a message-oriented scripting capability that can be initiated at the STFx. It can be used either in the integrated STFx and PTS mode or in the PSE (STFx) standalone mode. Refer to SST-646, Part I, Section 5, for details.

The basic concept of the message script is generation of a script list that consists of a set of time-triggered messages. Each message represents a user action and its associated message command from the STFx console. The script list is then executed chronologically based on the activation time. This list can be constructed offline via Editor, Notepad, or Excel. It can also be created online with actual message command initiation.

Once the script is created, it can be edited for content or timing information, saved, retrieved, or chained to another script. All PSimNet Station-to-PTS and PSIV STFx-to-STEP command/ messages can be part of the script.

The STFx script also provides for condition check and branch capabilities.

50.3.3.1.3.1.9 Timeliner Control Command Capability

Timeliner Control commands can be activated at the STFx via the PSIV protocol. These control commands can be used to install, remove, or execute the Timeliner bundle and sequences. This is used to emulate the ground controller action in the SPTC environment.

50.3.3.1.3.2 Graphical User Interface

The GUI performs both the control and monitoring functions. However, the GUI is not accessible to the PSE in a deployment configuration. It is usable for the PSE only when the PSE is configured in the Combined PSE/STFx mode for PTS development and testing.

All GUI actions are initiated from the Top Menu Bar Selection or Bottom Menu Bar Display/ Selection. The Top Menu Bar consists of a set of pulldown menu selections. The Bottom Menu Bar is primarily for status display and has two selections.

Menu selection displays the next level selections or directs the user to the appropriate workspace for further actions. The details of the GUI are provided in SST-646, Part I, Section 5. The following sections provide a short description on the GUI available in PSE software.

50.3.3.1.3.2.1 Top Menu Bar Selections

The Top Menu Bar Selections are as follows.

a. Configuration – A System Configuration Diagram that displays the status of available, active, or inactive Gateway processes

b. Moding – The following submenu selections are used in the STFx or Combined PSE/STFx to activate Moding commands as defined in Appendix III, Section 30.3.3.5.2. The command is passed to the PSE and executed in both the STFx and PSE when the activation time is reached.

    1. Initialization: Initializes the system to the selected Datastore point.

    2. Datastore: Makes and records a Datastore point.

    3. Freeze: Stops real-time model execution.

    4. Run: Starts real-time model execution.

    5. Return to Safestore: Returns first to the associated Datastore point then overwrite it with Safestore data.

    6. Safestore: Makes and records a Safestore.

    7. Hold: Puts the system in Hold and stops real-time model execution and all periodic data transfers.

8. Terminate: Terminates operation, disconnects, and puts the system in Ready mode.

c. Malfunction – The Control function is available in the STFx or Combined PSE/STFx. The Monitoring function is available in all modes of operation.

1. Malfunctions: Displays a list of all malfunctions defined in the malfunction sheet of the c:\data\data\database.xls file.

2. Active Malfunctions: Displays a summary of all active malfunctions.

d. DataView – The Control function is available in STFx or Combined PSE/STFx. The Monitoring function is available in all modes of operation.

1. DataView: Provides a utility to tabulate all selected data for viewing. Predefined frame data for various interface data can also be selected.

2. IO View: Provides a utility to tabulate groups of I/O for viewing.

3. Poke: Provides a list of all pokables defined in the poke sheet of the c:\data\data\database.xls file.

4. Poke Summary: Provides a summary of all active pokables that have been changed from the value in the current Datastore point.

e. Commands – All commands are issued from the STFx or Combined PSE/STFx.

1. CMDS to PSE: Provides a set of miscellaneous commands from the Station to PSE.

(a) Connect: Issues a Connect message to request the PSE to go to Ready mode.

(b) Ping: Pings the PSE from the Station to check the status of PSE.

(c) Poke: Provides a list of all pokables defined in the poke sheet of the c:\data\data\database.xls file.

(d) PSVOOC: Available when SCE is active, used to overwrite the mismatch during the PSE Panel Verification process.

2. Service-Requests: Emulates the PSE Service Requests by manually inserting the requests to the Health and Status message.

3. Timeliner-Script: Issues the PL-MDM Timeliner Script Control command from the STFx or Combined PSE/STFx to the STEP using PSIV protocol via Ethernet connecting STFx and STEP.

4. Message-Script: Generates and/or executes STFx script on the SPTC system.

f. Models

1. Core System Panel: Graphically displays or changes the core system resources and resource usage.

2. IIP-SIP Panel: Displays a graphic representation of the International Standard Payload Rack (ISPR)-Mounted Interface Panel (IIP) and Standoff-Mounted Interface Panel (SIP) panel with umbilical cords.

3. GPM: Displays a set of simple generic payload models used to test and verify the SPTC performances

4. User-Api: Displays the user module. The user can rearrange, delete, add, or modify all contents in the hierarchy of this module except the Common Database (CDB), which can only be relocated.

(a) User-Model

- PTS Base Model: A set of PTS resource usage templates.
- PTS Models: The recommended workspace to hold user models.

(b) CDB: The user must not do anything with this workspace except relocate it. The workspace and its subworkspace hold the PSE database (objects, data lists, data arrays, etc.). The DBG program generates the PSE database from all c:\data\data*.csv files created from the c:\data\data\database.xls file.

(c) User Initialization: Performs PTS-unique initialization during program loading.

(d) User-CDB: The recommended workspace for user data not defined in the DSD.

(e) STA-Base Models: A simple Station Resource model skeleton that performs simple and basic Station (STA) resources changes.

(f) External Models: The recommended workspace for user G2 FF interface procedures.

g. Logs

1. Event Log: Records all events automatically when the flag in c:\data\configuration\station-id.cfg file is set. The Log file is day-tagged and saved in the c:\data\logs directory.

2. Alarm Log: Records all alarms automatically when the flag in the c:\data\configuration\ station-id.cfg file is set. Model Alarm messages are defined in the c:\data\data\alarm-msg-list.csv file.

3. Error Log: Records all system errors or errors created by the PTS model when the flag in c:\data\configuration\station-id.cfg file is set. Model Error messages are defined in the c:\data\data\error-msg-list.csv file.

4. Save Log: Manually forces a save. The Log file will be date and time tagged.

h. Utilities

1. Development

(a) CDB

- Edit Data Files: Allows editing of the c:\data\data\database.xls file. This is the PSE DSD.
- Process Data Files: Performs PSE Database Generation. After generation is completed, saves the G2 modules. Brings down the PSE system and then restarts G2. This synchronizes G2 with G2 Gateway processes on the symbol attribute definitions.
- User CDB: Directs the user to user data placeholders.

(b) Gateway Standard Interfaces (GSI): Contains various selections that direct the user to the proper workspace for locations that hold the codes for specific functions relating to G2 and G2 Gateway process data exchanges:

- GSI_Codes
- Handler Flags
- 1553B Packets
- PEHG Packets
- PSIM Packets
- PSIV Packets

(c) Basics: Contains various selections that direct the user to the proper workspace for locations that hold the codes for specific functions relating to G2 executives:

- Basics
- Timing-Dev
- Development
- Common Rules
- Common Objects

(d) Sys Func: Contains various selections that direct the user to the proper workspace for locations that hold the G2 system codes and some PSE system codes:

- GFR
- GMS
- GXL
- Sys Proc.
- My-Functions

2. Maintenance

(a) Snapload: Takes a snapshot of the current memory image.

(b) Refresh Screen: Refreshes the screen displays.

(c) Menu Configuration: Arranges the screen layout.

(d) Menu Function: Provides the procedure used in menu configuration.

(e) Shutdown: Forces a local shutdown that brings down G2 and its Gateway processes.

3. Interface Monitoring

(a) 1553B Interfaces Control: Monitors and controls 1553B interfaces.

(b) SCE Test Panel: Mimic of the PSE I/O test box for testing and for verifying SCE interfaces.

(c) PSIV Interface Control: Monitors and controls PSIV interfaces.

(d) PEHG Interface Control: Monitors and controls PEHG interfaces.

4. PSim-Interface-Tests: Various GUIs developed for testing PSimNet interface integrity.

(a) PSE-Verifications: Executes an STFx script and records interface data in to and out of the communication port to allow semi-automatic verification of PSE functions.

(b) PSim-Fault Tests: Creates several PSimNet fault conditions to determine whether a PTS is able to handle abnormal conditions.

(c) Alter-PSE-seq-num: Manually increments the PSE sequence number to create a fault condition to determine whether the STFx is able to handle a wrong sequence number.

(d) Software Error: Manually creates a PSE software error to determine whether the STFx is able to accept this particular error message.

i. Help

1. Version

(a) Version: Displays the current PSE software version number.

(b) Version Document: Directs the user to the complete version document stored in the c:\data\helps directory.

2. Users Guide: Directs the user to the complete User’s Guide stored in the c:\data\helps directory.

j. Local Ctrl – Provides several non-message commands directed to the local station for testing and debugging:

1. Run: Disregard moding control and go to Run.

2. Freeze: Disregard moding control and go to Freeze.

3. Hold: Disregard moding control and go to Hold.

4. Real Time: Go back to the real-time mode.

5. Fast Time: Go to the fast time mode that tells the CPU to run the model as fast as the CPU resource permits.

6. Re-Initialize: Re-initialize the PSE system including all Gateway processes.

50.3.3.1.3.2.2 Bottom Menu Bar Displays/Selections

The Bottom Menu Bar Displays/Selections are as follows:

a. SGMT: Displays the current Simulated Greenwich Mean Time (SGMT) received from the Station. Updated only in Run mode.

b. GMT: Displays the current GMT. Updated continuously from the value received from the Connect message during initial connection.

c. Local Time: Displays the computer clock time based on the time difference set in the c:\data\configuration\station-id.cfg file from GMT. Updated continuously.

d. Training Session ID: Displays the Training Session ID received during the initial connection from the Station.

e. Malfunction: Displays the number of active malfunctions.

f. Datastore Number: Displays the current Datastore number.

g. Alarm Status: Alarm display flashes (on PSE only) if a user-created alarm condition exists. Clicking on the panel brings up the alarm message log.

h. Error Status: Error display flashes if a system or user-defined error condition exists. Clicking on the panel brings up the error message log.

i. PSE/STFx System Status:

    1. In Shutdn/In Hold/In Freeze/In Run: *In Shutdn* indicates the system is in startup or in the process of executing a Termination message. *In Hold*, *In Freeze*, and *In Run* indicate that the system is in the corresponding mode.

    2. Active/Ready/Inactive: *Active* indicates PSimNet communication is alive. *Ready* indicates the system is up and ready for PSimNet connection. *Inactive* indicates PSimNet communication is broken.

    3. In Real Time/In Fast Time/In Scripting: *In Real Time* indicates that the system is operating in real time. *In Fast Time* indicates that the system is operating as fast as the CPU allows and is disregarding scheduling synchronization. *In Scripting* indicates that the system is in the STFx script generation mode. In addition to requiring Hold mode, operator actions are recorded in a script but are not communicated across the PSimNet.

50.3.3.1.3.3 PTS Deployment Environment

50.3.3.1.3.3.1 SPTC Integration Capability

a. The detailed system configuration and setup are provided in SST-646, Part IV.

b. The PSE software provides SPTC integration capability as shown in Figures 50.1-2 and 50.3-2.

c. The configuration files in c:\data\configuration should be used to set up the PSE as a component in the SPTC environment.

d. The STFx emulates the SSTF CSIOP and IOS functions.

e. The STEP emulates the SSTF C&DH function.

f. All controlling and monitoring is done at the STFx and STEP.

50.3.3.1.3.3.2 SSTF Integration Capability

a. The detailed system configuration and setup is provided in SST-646, Part IV.

b. The PSE software provides SSTF integration capability as shown in Figure 50.1-1.

c. The configuration files in c:\data\configuration should be used to set up the PSE as the PTS in the SSTF environment.

d. The PSE hosts the payload training model, which responds to all control commands issued at the SSTF IOS and via the 1553B interface.

50.3.3.1.3.4 PTS Model Development Environment

50.3.3.1.3.4.1 Interface Data Definition Baseline

This section contains the interface data definitions for all data items provided in the PSE associated with MDM, PSimNet, and PEHG commands and data messages. In addition, it provides all available data transfers between the PSE G2 environment and the PSE FF environment. The links between the PSE G2 program and external interfacing systems (SSTF C&DH, CSIOP, PEHG, etc.) are G2 Gateways.

PSE packet constructions and design approaches are described in SST-646, Part I to Part V.

The baseline for the CCSDS primary and secondary header definitions is defined in SSP-41175, especially in the following tables and figures:

a. Figure 3.3.2.1.1-1, CCSDS Packet Format

b. Table 3.3.2.1.1-1, CCSDS Primary Header Field Definitions

c. Table 3.3.2.1.1-2, Secondary Header Field Definition

d. Figure 3.3.2.1.1-2, USOS Command Packet Format

e. Figure 3.3.2.1.1-3, USOS Data Packet ID Format

f. Table 3.3.2.1.1-3, USOS Command Packet ID Definition

g. Table 3.3.2.1.1-4, USOS Data Packet ID Definition

h. Table 3.3.2.2.2-1, Broadcast Time Message Content/Format

i. Figure 3.3.2.2.3-1, Broadcast Ancillary Data Layout

Revised and more explicit CCSDS header definitions are defined in SSP-57002, Payload Software Interface Control Document Template:

a. Table 3.1.2.2-1, CCSDS Header Definition MDM to Payload

b. Table 3.1.2.2-2, CCSDS Header Definition Payload to MDM

c. Figure 3.1.2.2-1, Payload Data Primary and Secondary Header – Telemetry Data to MDM

d. Figure 3.1.2.2-2, Payload Data Primary Header – Health and Status to Payload MDM

e. Figure 3.1.2.2-3, Payload Data Header – MDM to Payload (Response to Request)

f. Figure 3.1.2.2-4, Payload Data Header – MDM to Payload (Unique Ancillary Data)

g. Figure 3.1.2.2-5, Payload Data Header – MDM to Payload (Broadcast Ancillary Data)

h. Figure 3.1.2.2-6, Payload Data Header – MDM to Payload (File Transfer)

The baseline for MDM packet data definitions is defined in SSP-52050.

The baseline for PSimNet packet data definitions is defined in Appendix III, Section 30.4.2.

Many fields in the MDM headers are defined as “don’t care”. These fields are set to zeros in the PSE program.

There are two types of “do care” data in the headers: static data and dynamic data. Static data is predefined data such as the ‘0’ and ‘1’ in the figures in SSP-57002. They typically are fixed for a given PTS and/or for a given type of packet. Dynamic data is generated dynamically and may vary from packet to packet even for the same type of packet.

A complete packet can be assembled in the G2 Gateways or FF environment with the static header data, dynamic header data, and packet user data. Since static header data is predefined for a given PTS and a given packet type, only dynamic header data and packet user data are exchanged between PSE G2 Gateways and PSE G2 FF environments.

50.3.3.1.3.4.2 Interface Data Definition

The G2 Gateways and FF environment use C as the programming language. Data blocks in the message are stored in their raw form with appropriate offsets and partitioning.

The G2 language, on the other hand, is an object-oriented language with four types of data formats: integer (32 bits with 29 bits effective), float (64 bits), Boolean (32 bits), and text string. Therefore, it is not practical to create a G2 data buffer mirror imaging the message data block. The PSE software uses the item-list approach. An item-list for a data block lists, in order, each element in the data block as an item (or object). Each object has attributes cross-referencing to an address in a G2 data buffer.

Each table tabulates all data words in the message packet and provides the corresponding symbolic name or array name used in the G2 and/or FF environment. In Tables 50.3-6 to 50.3-33, except for the fixed data type array, G2 arrays are represented by item-list. The relation between the item-list and the G2 data buffer is described in SST-646, Part I, Section 6.

a. Table 50.3-6, Command – MDM to PL, defines the 64-word Command message. The header dynamic data and data message as indicated in this table are stored in a G2 integer array cmd-word-array[]. This array is also passed to FF C array cmddata_inb_all.cmd_wds_ data_array[] (referred to as CMD_array[] in the table). Note that cmd-word-array is passed to FF at the point of receiving the command packet at the 1553B Gateway. CMD_array[61] is set to 0 to indicate this data set is for Command message (1 for Request Response message). CMD_array[] is an integer 16 data array. The Logical Data Path (LDP) in header word-7 and the Subset ID in word-8 allow the Cmd Source to route the command to the proper destination Application Program Interface Definition (APID) using LDP as lookup.

b. Table 50.3-7, Request Responses – MDM to PL, defines the 13-word Request Response message. The header dynamic data and data message as indicated in the table are also passed to FF in CMD_array[]. Array element [61] is set to 1 to identify this as Request Response message. All Request Responses received from PL-MDM are passed to G2. See the description in Table 50.3-11, File Transfer (Read) – MDM to PL, for additional details.

c. Table 50.3-8, Broadcast Time – MDM to PL, defines a nonstandard message with a length of 8 words received once each second. It uses an 8-bit preamble instead of the standard CCSDS header. Timing information is passed to FF C array ffdata_inb_msg.misc_int16_array[] (referred to as FF_in[] in the table) through a G2 array ext-int-array-out[]. Note that the data passed to FF are integers. They must be processed to obtain the original data format in the message packet.

d. Table 50.3-9, Broadcast Ancillary Data – MDM to PL, defines the 64-word message. The 36 words of the 56-word data are high-rate data updating at 1 hertz and the other 20 words are low-rate data updating at 0.1 hertz. The high-rate and low-rate data are stored at different data buffers. The high-rate buffer is 10 frames long (360 words = 10 * 36) and the low-rate buffer is 100 frames long (2000 words = 100 * 20). For a given frame count M, the index to the high-rate frame data buffer is mod(M, 10) and the index to the low-rate frame data buffer is M. The header information is passed to FF C array ffdata-inb_ msg.misc_int16_ array[] through the G2 array ext-int-array-out[]. The data are deposited by G2 through an RPC directly to FF arrays badata_inb_msg.badata_hi_frame[].ba_ frame_hi_data_array[] and badata_inb_msg.badata_hi_frame[].ba_frame_lo_ data_ array[]. All arrays are data type integer 16.

e. Table 50.3-10, Unique Ancillary Data – MDM to PL, defines a 32-word message. The data identifier is data set 1 through 100. The PSE treats the data set as frame data 0 through 99. The header information is passed to FF array ffdata-inb_msg.misc_int16_array[] (referred to as FF_in[] in the table) through G2 array ext-int-array-out[]. The data are deposited by G2 RPC directly to FF arrays uadata_inb_all.uadata_data_sets[].ua_ds_data_array[]. All arrays are type integer 16.

f. Table 50.3-11, File Transfer (Read) – MDM to PL, defines the File Transfer messages. Request Responses received from the MDM are passed to FF as described in item b above and in Table 50.3-7. Request Responses associated with file transfer are 'FMT Timeout - 68', 'Unauthorized File Request - 76', 'File Transfer Completed - 79', 'Restart File Transfer - 80', and 'File Transfer Error - 82'. All are issued from the MDM to the PL. The codes 76, 79, and 82 (changed from 81) are passed from the 1553B Gateway to G2 through Request Responses. These Request Responses are then passed to FF C array CMD_array[]. The received file with file-id N is saved as c:\data\files\fileN.inb. The length of file information is not passed to FF as FF can obtain the file length from the file when the file transfer is completed.

When Service Request 16 is sent to the MDM for file-read, the PSE waits for the File Transfer command. If the file authorization of the source file at the MDM is wrong, it responds with a Request Response code 76 – Unauthorized File Request. When the File Transfer command arrives, PSE reads the file data and then waits for the next transactions based on instructions in the File Transfer command. When the file transfer is completed, MDM responds with a Request Response code of 79 – File Transfer Completed. If the file transfer failed for any reason, the MDM responds with a Request Response code 82 – File Transfer Error (changed from 81 on the earlier version). In between starting and ending, if the PL gets a checksum error for a block or mismatch in the block count number, it sends a Service Request 26 back to the MDM for Restart File Read from a previous data block.

When Service Request 17 is sent to the MDM for file-write, the PSE places the first block of file data on the bus. If the file authorization of the destination file at the MDM is wrong, it responds with a Request Response code 76 – Unauthorized File Request. The PSE waits for several frames then starts to place the following file data blocks on the bus at 100-millisecond intervals. When the file transfer is completed, the MDM responds with a Request Response code of 79 – File Transfer Completed. If the file transfer failed for any reason, the MDM responds with a Request Response code 82 – File Transfer Error. In between starting and ending, if MDM gets a checksum error for a block or a mismatch in the block count number, it sends a Request Response code 80 – Restart File Transfer to ask the PSE to restart from an earlier block.

Service Requests 24 ‘Stop File Read’ and 25 ‘Stop File Write’ and their Request Responses from the MDM are issued and handled by the payload simulation.

The issuing of the Restart from PSE for File Transfer Read or from MDM for File Transfer Write has no bearing on the final outcome of the file transfer, either completed or failed. When the bus is busy and/or the file is large, one may get numerous Restart requests. The Service Request or Request Response of ‘Restart File Transfer’ does not provide either a ground controller or the payload model with any meaningful information except that the file transfer is being attempted. Even if the model receives this information, it may be impossible to determine what should be sent to the ground. For example, an H&S packet may be sent to the ground once every 10 seconds. During that 10-second span, several Restart requests may occur and only one can be sent in the H&S packet. If one is sent with the H&S (first one, last one, or by chance any one of them), it provides no meaningful information. While the operator is pondering what is happening, a ‘File Transfer Completed’ message may arrive 10 seconds or 60 seconds later. What the ground controller needs to know is whether the file transfer completed or failed and why it failed. This information is available via the combination of Request Response codes 76, 79, 80, and 82 and Service Requests 16, 17, 24, and 25.

g. Table 50.3-12, Health and Status Data – PL to MDM, defines the maximum 1280-word message. The 1280 words are transferred in a maximum of 10 transactions each 128 words long. The H&S packet is sent at frame 00. High-rate H&S is sent once each second and low rate once every 10 seconds. There is only one 8-word header for the 10 transactions. Following the header is a 4-word Service Request. Therefore, the first frame data for H&S as defined in the PSE DSD is 116 words long. The following nine frames are 128 words each if they exist. The Service Request is not handled by simply placing the data in that 4-word area. It has to be invoked, as a Service Request is a one-shot transfer. Values (except subset-id and Caution-and-Warning) will be reset to zero after they have been sent. In the FF environment, the Service Request is issued through a procedure service_request() once Service Request Data are prepared. The other H&S data are accessed by a G2 RPC based on the PSE DSD definition. DSD information dictates to G2 the

H&S collection rate and size of the data. After collecting H&S data, the PSE sends the H&S packet according to schedule with a Service Request. All Service Requests are initiated in PSE G2 or FF except for a few concerning file transfers that are described in Table 50.3-11.

Word-13 of the Health & Status packet is reserved for the H&S cycle counter. The user can specify the way to manage this counter. If the user updates the value (0-65535) for each packet, PSE sends this number as is. If the user does not modify it, then PSE will manage the sequence count.

h. Table 50.3-13, Low-Rate Telemetry Data – PL to MDM, defines a 640-word message. The G2, based on the PSE DSD definition, automatically accesses the right amount of LRT data and sends it out on schedule. The sequence count (also for the H&S message) is managed in the PSE software.

i. Table 50.3-14, File Transfer (Write) – PL to MDM, defines the file transfer similar to Table 50.3-11.

j. Table 50.3-15, PEHG 1 Data – PL to PEHG, defines the 640-word PEHG-1 Data message. The data transfer from FF to G2 uses an Integer 16 C array ffdata_outb_msg.misc_int16_array[] (referred to as FF_out[] in the table). The first word of FF_out[] is not used. The second word is used for Error Code passing. The next word defines a trigger to connect or disconnect to a remote station. In the PSE PEHG setup, either the remote station or the local station can initiate the connect or disconnect command. In the G2 environment, set pehg1-connect-flag = true to initiate connect and set pehg1-disconnect-flag = true to initiate disconnect. In the FF environment, set FF_out[2] = 1 to initiate connect, set FF_out[2] = 2 to initiate disconnect; otherwise, set FF_out[2] = 0 as normal. Only when pehg1-active > 0 or FF_in[33] > 0 can PEHG-1 data be sent. To send PEHG-1 data, from the FF environment, set FF_out[3] = 1 and set FF_out[3] = 0 to stop the send.

In addition to loading the FF_out[] for PEHG data, this maximum 640-word buffer has to be defined in the PSE DSD. The size of the array defined in the DSD defines the size of the packet that will be sent. When the flag says send, G2 copies the first N elements of the FF array PEHG-1 data to a G2 array pehg1ot-array[], where N is the size defined in the PSE DSD and therefore the size of PEHG1ot-array[]. The destination IP address must be specified in the c:\data\configuration\1553b.cfg file.

k. Table 50.3-16, PEHG 2 Data – PL to PEHG, defines the PEHG-2 data message in exactly the same manner as PEHG-1 except for changing PEHG-1 to PEHG-2. FF sends the PEHG-2 data as the next 640-word block in the integer 16 C array ffdata_outb_msg.misc_int16_array[]. The configuration file for PEHG-2 is c:\data\configuration\pehg.cfg.

l. Table 50.3-17, Station Data Format 1 – Station to PTS, defines Station data message Format 1. All data items and types are predefined. All symbols in G2 are symbolic addressable. Refer to SST-646, Part I, Section 6, or Part V for information on how to address G2 symbols in PSE. The PSE is designed to handle five formats. However, the SSTF CSIOP uses Format 1 only. These are Station resources data, all in floating format except the GMT, SGMT, and SSTF Mode number. Refer to Appendix III, Section 30.4.2.3, for definition of the time variable type. Although the data type and size for every Station and PTS data are predefined, FF does not use this information to partition the data structure. Instead, FF uses the unsigned int8 array. The user needs to define and/or cast the data type for each data item needed for the model. The data type and size information for all entries are listed, in order, in the c:\data\data\stadata.idx file. Refer to SST-646, Part II, for the file format description.

m. Table 50.3-18, PTS Data Format 1 – PTS to Station, defines PTS data message Format 1. All data items and types are predefined. All symbols in G2 are symbolic addressable. Refer to SST-646, Part I, Section 6, or Part V for information on how to address G2 symbols in PSE. Although Appendix III Section 30.4.2.3.5 specifies that PTS data is sent at a 1-hertz rate, the PSE sends one of the five formats at each 200-millisecond interval. GMT times and the PTS mode number are automatically generated by the PSE software. All PTS data buffers are defined as placeholders just like the Station data buffer. The size and type of each entry is predefined. The PSE DSD type and size should never be changed. The user can replace the generic symbol names in the PSE DSD with user-defined names.

n. Table 50.3-19, PTS Data Format 2 – PTS to Station, defines PTS data message Format 2 the same way as Format 1. As described above, PTS data Formats 2, 3, 4, and 5 are placeholders. The data type of each entry is predefined. However, G2 allows the flexibility of changing the data type in the future. Thus, instead of using fixed data type arrays, it uses the item-list approach. An item-list for a data block lists, in order, each element in the data block as an item (or object). Each object has attributes cross-referencing to an address in a G2 data buffer. In the table, the item-list ptsdata-2-1-list[] contains all data objects for PTS data in data frame 1. In the variable name, the "2" indicates low-rate data and the "1" indicates frame 1 corresponding to Format 2. Element [0] is a dummy entry. Element [1] is the first data for that format. That data may be of any data type: integer, Boolean, float, or text as defined in the PSE DSD. In the actual DSD, since all types are pre-fixed, the PUDG data types (1/2/3/4/5/6/7/8 for unsigned8/char/float32/float64/int8/int16/int32/string) for that entry shall not be changed. The G2 data buffers are arranged according to data types: integer, float, Boolean, and text. The data arrays associated with this item-list are pts-int-array-2-1[], pts-log-array-2-1[], pts-flt-array-2-1[], and pts-txt-array-2-1[] for integer, Boolean, float, and text, respectively. The same naming conventions are applied to all G2 item-lists. Refer to SST-646, Part I, Section 6, for details.

o. Table 50.3-20, PTS Data Format 3 – PTS to Station, defines PTS data message Format 3 the same as for Formats 1 and 2.

p. Table 50.3-21, PTS Data Format 4 – PTS to Station, defines PTS data message Format 4 the same as for Formats 1 and 2.

q. Table 50.3-22, PTS Data Format 5 – PTS to Station, defines PTS data message Format 5 the same as for Formats 1 and 2.

r. Table 50.3-23, Poke Message – Station to PTS, defines the Station Poke message. The type and size of each entry is predefined. Unlike Station and PTS data, the messages are partitioned according to data type. Thus, the index in the array is referring to the offset of that item within that array.

s. Table 50.3-24, Data Reset Message – PTS to Station, defines the Poke Data Reset message. This message is transparent to the user and should not be used or altered. It is managed by the PSE for the Return to Datastore mode.

t. Table 50.3-25, Malfunction Message Format 1 – Station to PTS, defines the Simple malfunction type message. In G2, each Simple malfunction object has a state as its attribute. The FF C array contains the state only.

u. Table 50.3-26, Malfunction Message Format 2 – Station to PTS, defines the P1 malfunction type message. In G2, each P1 malfunction object has a state and error value as its attributes. The FF C has two separate arrays, one for the state and one for the P1-error value. Both are indexed by the malfunction number.

v. Table 50.3-27, Malfunction Message Format 3 – Station to PTS, defines the P2 malfunction type message. In G2, each P2 malfunction object has a state, a scale value, and a bias value as its attributes. The FF C has three separate arrays, one for the state, one for the scale values, and one for the bias values.

w. Table 50.3-28, Command From G2 to FF Using CMD Array, is a summary of the FF CMD_array[] layout as defined in Table 50.3-6. Entry usage has been defined in Table 50.3-6 and Table 50.3-7. Notice again that FF C array element [61] is used to identify whether this data belongs to the Command or Request Response message.

x. Table 50.3-29, Request Response From G2 to FF Using CMD Array, is a summary of FF CMD_array[] layouts as defined in Table 50.3-7. Entry usage has been defined in Table 50.3-6 and Table 50.3-7. Notice again that FF C array element [61] is used to identify whether this data belongs to the Command or Request Response message.

y. Table 50.3-30, MDM Header Data From G2 to FF Using Spare Array, defines the array used to pass dynamic MDM header information from G2 to FF. Since the G2 RPC cannot accept a null array, a dummy entry is included at the beginning of the G2 array ext-int-array-out[]. When FF processes this transfer, it skips the first G2 array entry and copies the contents of the second element of the G2 array into the first element of the C array.

z. Table 50.3-31, PSE Moding Control Data From G2 to FF Using Spare Array, defines the critical PSimNet message content passed to FF. These are data required for PTS operation. The other commands such as Ping are not available in G2.

aa. Table 50.3-32, PSE Status Data From G2 to FF Using Spare Array, defines some important PSE status passed to FF.

ab. Table 50.3-33, Data From FF to G2 Using Spare Array, provides a summary of FF to G2 int16 array layout and usage. The first element is not used. The second element FF_out[1] is used for FF to pass ‘Error Code’ to G2 then to the CSIOP. The error code has to be defined in the c:\data\data\error-message-list.csv file. The PSE invokes the procedure ‘call create-error-object (FF_out[1], 0)’ to pass the error code to the CSIOP through PSimNet. In addition to generating an error message, Error-Code 102 (FF_out[1] = 102) sets a G2 Boolean 1553-failure to true and thus stops all 1553B outbound messages. Error-Code 103 (FF_out[1] = 103) sets pehg-failure to true and stops all PEHG outbound messages. The outbound messages can be restarted by issuing error codes (FF_out[1] = 1002) for 1553b, (FF_out[1] = 1003) for PEHG, or (FF_out[1] = -1) for both. The -1, 1002, and 1003 error codes do not cause messages to be sent to the CSIOP and are not required to be in the error-message-list.csv file

In the following tables, the meanings of the headings are as indicated:

Word No.:	Word (2 bytes) offset in the packet
Byte No.:	Byte offset in PSimNet data buffer
Length (bits):	Data length in bits.
Field Name:	Name convention used in SSP-57002
Field Content:	A *bit pattern* represents predefined static data. A numeric *0* means every bit is ‘0’. *Blank* means data is supplied by PSE G2 or FF.
G2 Symbol:	Supplies the data if *Field Content* is blank for inbound data. An asterisk (*) indicates see *Comment* field for data source.
FF Symbol:	The corresponding data item in PSE FF. Supplies the data if *Field Content* is blank for outbound data. An asterisk (*) indicates see *Comment* field for data source.
Comment:	Explanatory information

The data types for G2 symbols are defined as

Flt	64 bits float
Log	32 bits Boolean
Int	32 bits (29 bits effective) integer for G2
Text	Text string
Item	G2 is an object-oriented programming language. The item-list identifies, in order, the object associated with each element in the data buffer. Based on attributes defined for each object, data are categorized and placed in separate integer, float, text, or logical data arrays. The data are reassembled in the PSE Gateway and/or FF to match the data block transferred on the network.

Unless otherwise noted, untyped G2 symbols are integers (32 bits with 29 bits effective).

For ease of reading, the following replacements are used in the tables for FF symbols. The dot (.) in a symbol represent a structure.

CMD_array[]	=int16 cmddata_inb_all.cmd_wds_data_array[]
FF_out[]	=int16 ffdata_outb_msg.misc_int16_array[]
FF_in[]	=int16 ffdata-inb_msg.misc_int16_array[]
FF_in-txt[]	=int16 ffdata_inb_msg.misc_text_array[]
BA_frame[].hi[]	=int16 badata_inb_msg.badata_hi_frame[].ba_frame_hi_data_array[]
BA_frame[].lo[]	=int16 badata_inb_msg.badata_lo_frame[].ba_frame_lo_data_array[]
UA_ds[].data[]	=int16 uadata_inb_all.uadata_data_sets[].ua_ds_data_array[]
HAS_frame[].data[]	=int16 hasdata_outb_msg.hasdata_frame[].has_frame_data_array[]
LRT_frame[].data[]	=int16 lrtdata_outb_msg.lrtdata_frame[].lrt_frame_data_array[]
Sta_frame[].data[]	=unsigned8 Stadata_inb_msg.pts_frame[].sta_frame_data_array[]
Pts_frame[].data[]	=unsigned8 Stadata_inb_msg.pts_frame[].pts_frame_data_array[]
poke_float[]	=float pokedata_inb_msg.poke_flt_array[]
poke_int32[]	=int32 pokedata_inb_msg.poke_int_array[]
poke_log[]	=unsigned8 pokedata_inb_msg.poke_log_array[]
poke_txt[].str[]	=string pokedata_inb_msg.poke_txt_array[][msg length]
malf_simp[]	=unsigned8 malfdata_inb_msg.malf_simp[].malf_state
malf_p1_state[]	=unsigned8 malfdata_inb_msg.malf_p1[].malf_p1_state
malf_p1_value[]	=float malfdata_inb_msg.malf_p1[].malf_p1_val1
malf_p2_state[]	=unsigned8 malfdata_inb_msg.malf_p2[].malf_p2_state
malf_p2_value1[]	=float malfdata_inb_msg.malf_p2[].malf_p2_val1

malf_p2_value2[]	=float malfdata_inb_msg.malf_p2[].malf_pw_val2
sr_subset_id	=int16 has_outb_sr_msg.has_subset_id
sr_id	=int16 has_outb_sr_msg.has_sr_id
sr_dataset_id	=int16 has_outb_sr_msg.has_sr_dataset_id
sr_data	=int16 has_outb_sr_msg.has_sr_data
sr_c_and_w	=int16 has_outb_sr_msg.has_c_and_w

Table 50.3-6 Command – MDM to PL

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID			*	Read by 1553b-gateway process from 1553b.cfg configuration file. Not passed to FF but is predefined by user.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		cmd-num of b1553-seq-num	CMD_array[53]	
3	16	Packet Length	119			
4	16	MSB of Coarse Time		cmd-gps-h	CMD_array[54]	
5	16	LSB of Coarse Time		cmd-gps-l	CMD_array[55]	
6	8	Fine Time		cmd-gps-f	CMD_array[56]	
	2	Time ID	‘01’			
	1	Checkword Indicator	‘1’			
	1	ZOE TLM	‘0’			
	4	Packet Type	‘1010’			
7	1	Spare	‘0’			
	4	Element ID	‘0001’			
	1	Command/Data Packet	‘0’			

Table 50.3-6 Command – MDM to PL (Cont’d)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
	2	Spare	‘00’			
	8	LDP Endpoint ID		cmd-ldp	CMD_array[60]	
8	16	Subset ID		cmd-subset-id	CMD_array[61]	
9	16	LSM – Unused		lsm-unused	CMD_array[57]	
10	8	LSM – Override		lsm-override	CMD_array[58]	
	8	LSM – Code		lsm-code	CMD_array[59]	
11	16	User Data		cmd-word-array[0]	CMD_array[0]	CMD_array[63] - 1 for Command, - 0 for normal
…	16	User Data				
63	16	User Data		cmd-word-array[52]	CMD_array[52]	
64	16	Checksum		cmd_checksum	CMD_array[62]	

Table 50.3-7 Request Responses – MDM to PL

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID			*	Read by 1553b-gateway process from 1553b.cfg configuration file. Not passed to FF but is predefined by user.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		rresp-num of b1553-seq-num	CMD_array[0]	
3	16	Packet Length	17			
4	16	MSB of Coarse Time		rresp-gps-h	CMD_array[1]	
5	16	LSB of Coarse Time		rresp-gps-l	CMD_array[2]	
6	8	Fine Time		rresp-gps-f	CMD_array[3]	
	2	Time ID	‘01’			
	1	Checkword Indicator	‘0’			
	1	ZOE TLM	‘0’			
	4	Packet Type	‘0100’			
7	1	Spare (1 bit)	‘0’			
	4	Element ID Field	‘0001’			
	1	Command/Data Packet	‘1’			

Table 50.3-7 Request Responses – MDM to PL (Cont’d)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
	4	Spare	‘0001’			
	6	Format ID (6 bits)	‘001010’			
8	16	Subset ID		rresp-subset-id	CMD_array[4]	CMD_arrays{63} = 2 for Request Response, = 0 for normal
9	16	Payload Request ID		resp-req-id	CMD_array[5]	
10	16	Request Data		rresp-req-data	CMD_array[6]	
11	16	Result Code		rresp-req-result-code	CMD_array[7]	
12	16	Request Response Data		rresp-data	CMD_array[8]	
13	16	Checksum		rresp-checksum	CMD_array[9]	

Table 50.3-8 Broadcast Time – MDM to PL

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	8	CCSDS Preamble field	‘01010000’			
	8	BCD Year – MSB		btime-yyyy	FF_in[19]	Ranges 19 – 20
2	8	BCD Year – LSB				Ranges 0 – 99
	8	BCD Month		btime-mmm	FF_in[20]	Ranges 1 – 12
3	8	BCD Day of Month		btime-dd	FF_in[21]	Ranges 1 – 31
	8	BCD Hours		btime-hh	FF_in[22]	Ranges 0 – 23
4	8	BCD Minutes		btime-mm	FF_in[23]	Ranges 0 – 59
	8	BCD Seconds		btime-ss	FF_in[24]	Ranges 0 – 59
5	12	Spare	0			
	4	Binary Subseconds – Most Significant 4 bits		btime-micro-sec	FF_in[25]	
6	16	Binary Subsecond – Least Significant 16 bits				Range 0 – 1048575 at 1 microsecond per unit
7	16	UTS Conversion Parameter	0			Unused. Range 0 – 65535. Always set to zero.
8	16	Non CCSDS Seconds/Subseconds		btime-non-ccsds-second	FF_in[26]	Range 0 – 65535

Table 50.3-9 Broadcast Ancillary Data – MDM to PL

Word No.	Length (bits)	Field Name	Field Contents	G2 Symbol	FF Symbol	Comments
1	3	Version Number	‘000’			
	1	Type	‘0’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID			*	Read by 1553b-gateway process from 1553b.cfg configuration file. Not passed to FF but is predefined by user.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		badata-num of b1553-seq-num	FF_in[6]	
3	16	Packet Length	121			
4	16	MSB of Coarse Time		badata-gps-h	FF_in[7]	
5	16	LSB of Coarse Time		badata-gps-l	FF_in[8]	
6	8	Fine Time		badata-gps-f	FF_in[9]	
	2	Time ID	‘01’			
	1	Checkword Indicator	‘0’			
	1	ZOE TLM	‘0’			
	4	Packet Type	‘0111’			
7	1	Spare	‘0’			
	4	Element ID	‘0001’			
	1	Command/Data Packet	‘1’			

Table 50.3-9 Broadcast Ancillary Data – MDM to PL (Cont’d)

Word No.	Length (bits)	Field Name	Field Contents	G2 Symbol	FF Symbol	Comments
	4	Version ID	‘0001’			
	6	Format ID	‘001011’			
8	9	Spare	‘000000000’			
	7	Frame ID (0-99)		mdm-frame	FF_in[41]	PSE deposits BA frame data to FF hi- and lo-rate data buffer directly.
9	16	User Data		Item badata-1-m-list[1]	BA_frame[m].hi[0]	High-rate data (36 words) is stored in hi-rate data buffer index = mod(frame count = m,10).
…	16	User Data				
44	16	User Data		Item badata-1-m-list[36]	BA_frame[m].hi[35]	
45	16	User Data		Item badata-2-m-list[1]	BA_frame[m].lo[0]	Low-rate date (20 words) is stored in lo-rate data buffer index = frame count = m.
…	16	User Data				
64	16	User Data		Item badata-2-m-list[20]	BA_frame[m].lo[19]	

Table 50.3-10 Unique Ancillary Data – MDM to PL

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID			*	Read by 1553b-gateway process from 1553b.cfg configuration file. Not passed to FF but is predefined by user.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		uadata-num of b1553-seq-num	FF_in[0]	
3	16	Packet Length	57			
4	16	MSB of Coarse Time		uadata-gps-h	FF_in[1]	
5	16	LSB of Coarse Time		uadata-gps-l	FF_in[2]	
6	8	Fine Time		uadata-gps-f	FF_in[3]	
	2	Time ID	‘01’			
	1	Checkword Indicator	‘0’			
	1	ZOE TLM	‘0’			
	4	Packet Type	‘0111’			
7	1	Spare	‘0’			
	4	Element ID	‘0001’			
	1	Command/Data Packet	‘1’			

Table 50.3-10 Unique Ancillary Data – MDM to PL (Cont'd)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
	4	Version ID	'0001'			
	6	Format ID	'001001'			
8	16	Subset ID		ua-subset-id	FF_in[4]	
9	16	Data Set ID		ua-dataset-id	FF_in[5]	PSE deposits UA data set to FF data buffer directly.
10	16	User Data (23 words)		Item uadata-2-m-list[1]	UA_ds[m].data[0]	Blocks of 23 words are stored in data buffer index = dataset – 1 = m.
…	16	User Data				
32	16	User Data		Item uadata-2-m-list[23]	UA_ds[m].data[22]	

Table 50.3-11 File Transfer (Read) – MDM to PL

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID			*	Read by 1553b-gateway process from 1553b.cfg configuration file. Not passed to FF but is predefined by user.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		ftdata-num of b1553-seq-num	FF_in[37]	
3	16	Packet Length			*	= file length + 26 - 1 <= 567
4	16	MSB of Coarse Time		ftdata-gps-h	FF_in[38]	
5	16	LSB of Coarse Time		ftdata-gps-l	FF_in[39]	
6	8	Fine Time		ftdata-gps-f	FF_in[40]	
	8	Don’t care	0			
7	16	Don’t care	0			
8	16	Don’t care	0			
9	16	Don’t care	0			
10	16	Don’t care	0			
11	16	Don’t care	0			
12	16	Block Number		ftdata-in-block-num	FF_in[38]	
13	16	Don’t care	0			

Table 50.3-11 File Transfer (Read) – MDM to PL (Cont'd)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
14	16	Length of File MSW		ffdata-in-len	FF_in[16]	Combined LSW and MSW.
15	16	Length of File LSW				Combined in FF_in[40].
16	16	Number of Words in Data Field		ffdata-in-words	FF_in[17]	
17	16	File Data				File data is managed by PSE. When file transfer is completed, file is stored in c:\data\files\fileN.inb, where N is the file ID in the Service Request.
…	16	File Data				
<= 288	16	Check Sum		ffdata-in-checksum	FF_in[18]	

Table 50.3-12 Health and Status Data – PL to MDM

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID		*		Read by 1553b-gateway process from 1553b.cfg configuration file. No need to pass from FF to G2.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		hasdata-num of b1553-seq-num		Counter is managed in PSE.
3	16	Packet Length		*		Calculated by PSE Gateway process.
4	16	Don’t care	0			
5	16	Don’t care	0			
6	16	Don’t care	0			
7	16	Don’t care	0			
8	16	Don’t care	0			
9	16	Subset ID			Sr_subset_id	Service Request is issued in FF by calling service_request(). PSE then places the Service Request information in HAS data words 9 through 12.
10	16	Service Request ID			Sr_id	
11	16	Service Request Data			Sr_dataset_id	
					Sr_data	

Table 50.3-12 Health and Status Data – PL to MDM (Cont'd)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
12	16	Caution & Warning			Sr_c_and_w	
13	16	User Data		Item hasdata-1-0-list[1] Item hasdata-2-0-list[1]	Has_frame[0].data[0]	PSE G2 via RPC accesses FF data blocks for the frame. Frame 0 data block is of size 116 words in PSE DSD. '1/2' for hi/lo rate. If set to 0 always, PSE will manage the sequence count.
…	16	User Data				
128	16	User Data		Item hasdata-1-0-list[116] Item hasdata-2-0-list[116]	Has_frame[0].data[115]	
…	16	User Data				
…	16	User Data		Item hasdata-1-m-list[] Item hasdata-2-m-list[]	Has_frame[m].data[]	Data are defined in blocks of 128 words from frame 1 to frame 9 in PSE DSD.
…	16	User Data				
1280	16	User Data		Item hasdata-1-9-list[128] Item hasdata-2-9-list[]	Has_frame[9].data[127]	

Table 50.3-13 Low-Rate Telemetry Data – PL to MDM

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID		*		Read by 1553b-gateway process from 1553b.cfg configuration file. No need to pass from FF to G2.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		lrtdata-num of b1553-seq-num		Counter is managed in PSE.
3	16	Packet Length		*		Calculated by PSE Gateway process.
4	16	MSB of Coarse Time		*		Calculated by PSE Gateway process.
5	16	LSB of Coarse Time		*		Calculated by PSE Gateway process.
6	8	Fine Time		*		Calculated by PSE Gateway process.
	2	Time ID	‘01’			
	1	Checkword Indicator	‘0’			
	1	ZOE TLM	‘0’			
	4	Packet Type	‘00000’			

Table 50.3-13 Low-Rate Telemetry Data – PL to MDM (Cont'd)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
7	1	Spare	'0'			
	4	Element ID	'0001'			
	1	Command/Data Packet	'1'			
	4	Version ID	'0001'			
	6	Format ID	'000010'			
8	9	Spare	'000000000'			
	7	Frame ID (0-99)		*		Current frame supplied by PSE.
9	16	User Data		Item lrtdata-1-m-list[1] Item lrtdata-2-m-list[1]	Lrt_frame[m].data[0]	PSE G2 via RPC accesses FF data blocks for the frame. Data are defined in blocks of 632 words in PSE DSD. '1/2' for hi/lo rate. M = frame.
…	16	User Data				
640	16	User Data		Item lrtdata-1-m-list[632] Item lrtdata-2-m-list[632]	Lrt_frame[m].data[631]	

Table 50.3-14 File Transfer (Write) – PL to MDM

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	3	Version Number	‘000’			
	1	Type	‘1’			
	1	Secondary Header Flag	‘1’			
	1	Application Process ID				Read by 1553b-gateway process from 1553b.cfg configuration file. No need to pass from FF to G2.
2	2	Sequence Flags	‘11’			
	14	Packet Sequence Count		*		Counter is managed in PSE.
3	16	Packet Length		*		Calculated by PSE Gateway process.
4	16	MSB of Coarse Time	0			Not used
5	16	LSB of Coarse Time	0			Not used
6	8	Fine Time	0			Not used
	8	Don’t care	0			
7	16	Don’t care	0			
8	16	Don’t care	0			
9	16	Don’t care	0			
10	16	Don’t care	0			
11	16	Don’t care	0			
12	16	Block Number		*		Calculated by PSE Gateway process.

Table 50.3-14 File Transfer (Write) – PL to MDM (Cont'd)

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
13	16	Don't care	0			
14	16	Length of File MSW		*		Calculated by PSE Gateway process.
15	16	Length of FILE LSW		*		Calculated by PSE Gateway process.
16	16	Number of Words in Data Field		*		Calculated by PSE Gateway process
17	16	File Data				File data is managed by PSE. When file transfer is started, PSE sends file stored in c:\data\files\ fileN.otb, where N is the file ID in Service Request.
…	16	File Data				
<= 288	16	Check Sum		*		Calculated by PSE Gateway process.

Table 50.3-15 PEHG 1 Data – PL to PEHG

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	PEHG 1 User Data		ext-int-array-in[5]	FF_out[4]	FF_out[2] = 0 normal, =1 to connect to PEHG 1, = 2 to disconnect from PEHG 1. FF_out[3] = 0 ignore, = 1 send PEHG 1 data.
2	16	PEHG 1 User Data		ext-int-array-in[6]	FF_out[5]	
…	16	PEHG 1 User Data				
640	16	PEHG 1 User Data		ext-int-array-in[644]	FF_out[643]	

Table 50.3-16 PEHG 2 Data – PL to PEHG

Word No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	PEHG 2 User Data		ext-int-array-in[647]	FF_out[646]	FF_out[644] = 0 normal, =1 to connect to PEHG 2, = 2 to disconnect from PEHG 2. FF_out[645] = 0 ignore, = 1 send PEHG 2 data.
2	16	PEHG 2 User Data		ext-int-array-in[648]	FF_out[647]	
…	16	PEHG 2 User Data				
640	16	PEHG 2 User Data		ext-int-array-in[1286]	FF_out[1285]	

Table 50.3-17   Station Data Format 1 – Station to PTS

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID	1			
3	16	Destination ID			*	Generated by PSE. Unique value defined by SSTF specified in c:\data\configuration\pse.cfg file.
5	8	Message Type	3			
6	8	Version	1			
7	16	Message Length	81			
9	16	Sequence Number	0			Not used
11	16	Control Field	1			
13	32	Main Bus Voltage		Float main_bus_pwr	Sta_frame[0].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
17	32	Aux Bus Voltage		Float aux_bus_pwr	Sta_frame[0].data[4]	
21	32	Coolant Flow Low		Float coolant_flow_low	Sta_frame[0].data[8]	
25	32	Coolant Temp Low		Float coolant_temp_low	Sta_frame[0].data[12]	
29	32	Coolant Flow Mod		Float coolant_flow_mod	Sta_frame[0].data[16]	
33	32	Coolant Temp Mod		Float coolant_temp_mod	Sta_frame[0].data[20]	
37	32	Cabin Temp		Float room_temp	Sta_frame[0].data[24]	
41	32	Cabin Pressure		Float room_pressure	Sta_frame[0].data[28]	

Table 50.3-17 Station Data Format 1 – Station to PTS (Cont'd)

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
45	32	N2 Pressure Available		Float N2_available	Sta_frame[0].data[32]	
49	32	Vacuum Available		Float vac_available	Sta_frame[0].data[36]	
53	32	Exhaust Vac Available		Float exhaust_vac_available	Sta_frame[0].data[40]	
57	32	SSTF GMT			Sta_frame[0].data[44]	
61	32				Sta_frame[0].data[48]	
65	32				Sta_frame[0].data[52]	
69	32	SSTF SGMT			Sta_frame[0].data[56]	
73	32				Sta_frame[0].data[60]	
77	32				Sta_frame[0].data[64]	
81	8	SSTF Mode Number			Sta_frame[0].data[65]	

Table 50.3-18 PTS Data Format 1 – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	13			
6	8	Version	1			
7	16	Message Length	85			
9	16	Sequence Number	0			Not used
11	16	Control Field	1			
13	32	Main Power Used		Float main_pwr_used	Pts_frame[0].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
17	32	Aux Power Used		Float aux_pwr_used	Pts_frame[0].data[4]	
21	32	Heat Added Low		Float heat_dissipated_low	Pts_frame[0].data[8]	
25	32	Heat Added Mod		Float heat_dissipated_mod	Pts_frame[0].data[12]	
29	32	Valve Position Mod		Float valve_position_mod	Pts_frame[0].data[16]	
33	32	Heat Added to Cabin		Float heat_vented	Pts_frame[0].data[20]	
37	32	N2 Used		Float nitrogen_used	Pts_frame[0].data[24]	
41	32	Vacuum Used		Float vac_used	Pts_frame[0].data[28]	
45	32	Waste Gas Flow		Float exhaust_used	Pts_frame[0].data[32]	
49	32	PTS GMT			Pts_frame[0].data[36]	Generated by PSE.

Table 50.3-18 PTS Data Format 1 – PTS to Station (Cont'd)

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
53	32				Pts_frame[0].data[40]	Generated by PSE.
57	32				Pts_frame[0].data[44]	Generated by PSE.
61	32	PTS SGMT			Pts_frame[0].data[48]	Generated by PSE.
65	32				Pts_frame[0].data[52]	Generated by PSE.
69	32				Pts_frame[0].data[56]	Generated by PSE.
73	32	FSW Perceived GMT			Pts_frame[0].data[60]	Generated by PSE.
77	32				Pts_frame[0].data[64]	Generated by PSE.
81	32				Pts_frame[0].data[68]	Generated by PSE.
85	8	PTS Mode Number		Int mode-pse	Pts_frame[0].data[72]	Generated by PSE.

Table 50.3-19 PTS Data Format 2 – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	13			
6	8	Version	1			
7	16	Message Length	1212			
9	16	Sequence Number	0			Not used
11	16	Control Field	2			
13	32	Lookable Float		Item ptsdata-2-1-list[1]	Pts_frame[1].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
…	32	Lookable Float				
1209	32	Lookable Float			Pts_frame[1].data[796]	

Table 50.3-20 PTS Data Format 3 – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	13			
6	8	Version	1			
7	16	Message Length	812			
9	16	Sequence Number	0			Not used
11	16	Control Field	3			
13	32	Lookable Integer 32		Item ptsdata-2-2-list[1]	Pts_frame[2].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
…	32	Lookable Integer 32				
809	32	Lookable Integer 32			Pts_frame[2].data[796]	

Table 50.3-21 PTS Data Format 4 – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	13			
6	8	Version	1			
7	16	Message Length	812			
9	16	Sequence Number	0			Not used
11	16	Control Field	4			
13	32	Lookable Integer 32		Item ptsdata-2-3-list[1]	Pts_frame[3].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
…	32	Lookable Integer 32				
809	32	Lookable Integer 32			Pts_frame[3].data[796]	

Table 50.3-22 PTS Data Format 5 – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	13			
6	8	Version	1			
7	16	Message Length	1112			
9	16	Sequence Number	0			Not used
11	16	Control Field	5			
13	16	Lookable Integer 16		Item ptsdata-2-4-list[1]	Pts_frame[4].data[0]	Starting bytes. Choose the appropriate number of bytes corresponding to the data type defined in PSE DSD.
…	16	Lookable Integer 16				
413	8	Lookable Integer 8				
…	8	Lookable Integer 8				
463	8	Lookable Boolean				
…	8	Lookable Boolean				
513	16	Lookable Group DI				
…	16	Lookable Group DI				
713	16	Lookable Desired DI				
…	16	Lookable Desired DI				
913	320	Lookable String 40				
…	320	Lookable String 40				
1073	320	Lookable String 40			Pts_frame[4].data[1060]	

Table 50.3-23 Poke Message – Station to PTS

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID	1			
3	16	Destination ID			*	Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
5	8	Message Type	5			
6	8	Version	1			
7	16	Message Length	1172			
9	16	Sequence Number				Generated by PSE, maintained by CSIOP.
11	16	Control Field	1			
13	32	Enterable Float		Item poke-list[1]	Poke_float[0]	Partition for data types.
…	32	Enterable Float				
409	32	Enterable Float			Poke_float[99]	
413	32	Enterable Integer 32			Poke-Int32[0]	
…	32	Enterable Integer 32				
613	16	Enterable Integer 16				
…	16	Enterable Integer 16				
693	8	Enterable Integer 8				
…	8	Enterable Integer 8				
732	8	Enterable Integer 8			Poke_int32[129]	
733	8	Enterable Boolean			Poke_log[0]	
…	8	Enterable Boolean				
772	8	Enterable Boolean			Poke_log[39]	

Table 50.3-23 Poke Message – Station to PTS (Cont’d)

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
773	320	Enterable String 40			Poke_txt[0].str[msg length]	
…	320	Enterable String 40				
1133	320	Enterable String 40		Item poke-list[280]	Poke_txt[9].str[msg.length]	

Table 50.3-24 Data Reset Message – PTS to Station

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID			*	Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
3	16	Destination ID	1			
5	8	Message Type	16			
6	8	Version	1			
7	16	Message Length	1172			
9	16	Sequence Number				Generated and maintained by PSE.
11	16	Control Field	1			
13	32	Enterable Float		Item poke-list[1]	No value in FF	All data are generated by PSE based on datastored Poke message.
…	32	Enterable Float				
409	32	Enterable Float				
413	32	Enterable Integer 32				
…	32	Enterable Integer 32				
613	16	Enterable Integer 16				
…	16	Enterable Integer 16				
693	8	Enterable Integer 8				
…	8	Enterable Integer 8				
732	8	Enterable Integer 8				
733	8	Enterable Boolean				
…	8	Enterable Boolean				
772	8	Enterable Boolean				
773	320	Enterable String 40				
…	320	Enterable String 40				
1133	320	Enterable String 40				

Table 50.3-25 Malfunction Message Format 1 – Station to PTS

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID	1			
3	16	Destination ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
5	8	Message Type	4			
6	8	Version	1			
7	16	Message Length	312			
9	16	Sequence Number				Sequence count maintained by CSIOP.
11	16	Control Field	1			
13	8	Simple Malfunction		Item-malf-simp-list[1]	Malf_simp[0]	Fixed size structure in C. In G2, addressable via user-defined symbol in PSE DSD for Simple malfunction.
…	8	Simple Malfunction				
312	8	Simple Malfunction		Item-malf-simp-list[300]	Malf_simp[299]	

Table 50.3-26 Malfunction Message Format 2 – Station to PTS

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID	1			
3	16	Destination ID		*		Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
5	8	Message Type	4			
6	8	Version	1			
7	16	Message Length	762			
9	16	Sequence Number				Sequence count maintained by CSIOP.
11	16	Control Field	2			
13	8	P1 Malfunction Active		Item malf-p1-list[1]	Malf_p1_state[0]	Fixed size structure in C. In G2, addressable via user-defined symbol in PSE DSD for P1 malfunction.
14	32	P1 Malfunction Value		*	Malf_p1_value[0]	In G2, it is the attribute of the item malf-p1.
…	8	P1 Malfunction Active				
…	32	P1 Malfunction value				
758	8	P1 Malfunction Active		Item malf-p1-list[150]	Malf_p1_state[149]	
759	32	P1 Malfunction Value		*	Malf_p1_value[149]	

Table 50.3-27 Malfunction Message Format 3 – Station to PTS

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
1	16	Source ID	1			
3	16	Destination ID				Generated by PSE. Unique value defined by SSTF specified in c:\data\ configuration\pse.cfg file.
5	8	Message Type	4			
6	8	Version	1			
7	16	Message Length	462			
9	16	Sequence Number				Sequence count maintained by CSIOP.
11	16	Control Field	3			
13	8	P2 Malfunction Active		Item malf-p2-list[1]	Malf_p2_state[0]	Fixed size structure in C. In G2, addressable via user-defined symbol in PSE DSD for P2 malfunction.
14	32	P2 Malfunction Value 1		*	Malf_p2_value1[0]	In G2, it is the attribute of the item malf-p2.
18	32	P2 Malfunction Value 2		*	Malf_p2_value2[0]	In G2, it is the attribute of the item malf-p2.
…	8	P2 Malfunction Active				
…	32	P2 Malfunction Value 1				
…	32	P2 Malfunction Value 2				

Table 50.3-27 Malfunction Message Format 3 – Station to PTS (Cont'd)

Byte No.	Length (bits)	Field Name	Field Content	G2 Symbol	FF Symbol	Comment
454	8	P2 Malfunction Active		Item malf-p2-list[50]	Malf_p2_state[49]	
455	32	P2 Malfunction Value 1		*	Malf_p2_value1[49]	
459	32	P2 Malfunction Value 2		*	Malf_p2_value2[49]	

Table 50.3-28 Command From G2 to FF Using CMD Array

Data	Description	G2 Symbol	G2 Array cmd-word-array[]	FF C Array CMD_array[]	Comment
Command	Command Word 1		0	0	
	Command Word 53		52	52	
	Sequence count	cmd-num of b1553-seq-num	53	53	
	MSB of coarse time	cmd-gps-h	54	54	
	LSB of coarse time	cmd-gps-l	55	55	
	Fine time	cmd-gps-f	56	56	
	LSM – unused	lsm-unused	57	57	
	LSM – override	lsm-ovrride	58	58	
	LSM – code	lsm-code	59	59	
	Logical data path	cmd-ldp	60	60	
	Subset ID	cmd-subset-id	61	61	
	Command message checksum	cmd-checksum	62	62	
	Command or Request Response		63	63	= 0 for Command

Table 50.3-29 Request Response From G2 to FF Using CMD Array

Data	Description	G2 Symbol	G2 Array RR-word-array[]	FF C Array CMD_array[]	Comment
Request Response	Sequence count	rresp-num of b1553-seq-num	0	0	
	MSB of coarse time	rresp-gps-h	1	1	
	LSB of coarse time	rresp-gps-l	2	2	
	Fine time	rresp-gps-f	3	3	
	Original SR subset ID	rresp-subset-id	4	4	
	Original SR ID	rresp-req-id	5	5	
	Original SR data	rresp-req-data	6	6	
	SR result code	rresp-req-result-code	7	7	
	Request Response data	rresp-data	8	8	
	Request Response checksum	rresp-checksum	9	9	
	Spare		...	...	
	Command or Request Response		63	63	= 1 for Request Response

Table 50.3-30 MDM Header Data From G2 to FF Using Spare Array

Data	Description	G2 Symbol	G2 Array ext-int-array-out[]	FF C Array FF_in[]	Comment
	Dummy entry		0		Do not use this entry. G2 RPC does not take null array.
UADATA	CCSDS sequence count	uadata-num of b1553-seq-num	1	0	
	CCSDS time MSW	uadata-gps-h	2	1	
	CCSDS time LSW	uadata-gps-l	3	2	
	CCSDS fine time	uadata-gps-f	4	3	
	UA Subset ID	ua-subset-id	5	4	
	UA Dataset ID	ua-dataset-id	6	5	
BADATA	CCSDS sequence count	badata-num of b1553-seq-num	7	6	
	CCSDS time MSW	badata-gps-h	8	7	
	CCSDS time LSW	badata-gps-l	9	8	
	CCSDS fine time	badata-gps-f	10	9	
FXFER	CCSDS sequence count	ftdata-in-num of b1553-seq-num	11	10	
	CCSDS time MSW	ftdata-gps-h	12	11	
	CCSDS time LSW	ftdata-gps-l	13	12	
	CCSDS fine time	ftdata-gps-f	14	13	
	Block number	ftdata-in-block-num	15	14	
	Inbound file ID	ftdata-in-ID	16	15	The last completed file transfer-read file ID.

Table 50.3-30 MDM Header Data From G2 to FF Using Spare Array (Cont'd)

Data	Description	G2 Symbol	G2 Array ext-int-array-out[]	FF C Array FF_in[]	Comment
	Inbound file transfer completed	Ftdata-in-completed	17	16	ftdate-in-completed = 0/1 when (service request is issued)/(file xfer is completed)
	Inbound file length	Ftdata-in-words	18	17	File length
	Inbound file checksum	Ftdata-in-checksum	19	18	File checksum
BTIME	Year (BCD format)	Btime-yyyy	20	19	
	Month (BCD format)	Btime-mmm	21	20	
	Day (BCD format)	Bitme-dd	22	21	
	Hour (BCD format)	Btime-hh	23	22	
	Min (BCD format)	Btime-mm	24	23	
	Second (BCD format)	Btime-ss	25	24	
	Microseconds (BCD format)	Btime-micro-sec	26	25	
	Non-CCSDS seconds/subseconds	Btime-non-ccsds-second	27	26	

Table 50.3-31 PSE Moding Control Data From G2 to FF Using Spare Array

Data	Description	G2 Symbol	G2 Array ext-int-array-out[]	FF C Array FF_in[]	Comment
PSimNet	Mode	mode-pse	28	27	
	Safestore number	ss-num	29	28	1 – 4
	Datastore number	pse-ic-num	30	29	Same as current IC number
	Connection status	connection-status	31	30	0/1/2 for inshutdow/not ready/ready
	Text session ID	session-id	ext-txt-array-out[1]	FF_in-txt[0] [msg length]	

Table 50.3-32 PSE Status Data From G2 to FF Using Spare Array

Data	Description	G2 Symbol	G2 Array ext-int-array-out[]	FF C Array FF_in[]	Comment
	Connect to SSTF	on-sstf	32	31	1/0 for yes/no
	Spare		33	32	
	Connected to 1553B	on-1553b	34	33	1/0 for yes/no
	Connected to PSimNet	on-psim	35	34	1/0 for yes/no
	Activity on 1553B	1553b-active	36	35	> 0 is connected, 30-second countdown time
	Activity on PSimNet	psim-active	37	36	> 0 is connected, 30-second countdown time
	Activity on PEHG 1	Pehg1-active	38	37	> 0 is connected, 30-second countdown time
	Activity on PEHG 2	Pehg2-active	39	38	> 0 is connected, 30-second count down time
	HAS data rate	has-rate	40	39	1 for high rate, 2 for low rate
	Spare		41	40	
	Current MDM frame count	mdm-frame	42	41	0 – 99
	Current PSimNet frame count	psim-frame	43	42	0 – 4

Table 50.3-33   Data From FF to G2 Using Spare Array

Data	Description	G2 symbol	G2 array Ext-int-array-in[]	FF C Array FF_out []	Comment
	Dummy entry		0		Do not use this entry. G2 RPC does not take null array.
	Spare		1	0	
PSimNet	Error code	error-num	2	1	Used in call create-error-object(error-num,0).
PEHG 1	PEHG 1 connect/disconnect flag		3	2	0 for neutral, 1 for connect to remote station, 2 for disconnect from remote station.
	PEHG 1 data transfer flag		4	3	1 for PEHG 1 data transfer, 0 for ignore.
	PEHG 1 data		5	4	
	PEHG 1 data		6	5	
	PEHG 1 data		7	6	
	PEHG 1 data		...	...	
	PEHG 1 data		...	...	
	PEHG 1 data		...	...	
	PEHG 1 data		...	...	
	PEHG 1 data		644	643	Max size = 640 words; must match DSD definition.

Table 50.3-33 Data From FF to G2 Using Spare Array (Cont'd)

Data	Description	G2 Symbol	G2 array Ext-int-array-in[]	FF C Array FF_out []	Comment
PEHG 2	PEHG 2 connect/disconnect flag		645	644	0 for neutral, 1 for connect to remote station, 2 for disconnect from remote station.
	PEHG 2 data transfer flag		646	645	1 for PEHG 2 data transfer, 0 for ignore.
	PEHG 2 data		647	646	
	PEHG 2 data		648	647	
	PEHG 2 data		649	648	
	PEHG 2 data		...	...	
	PEHG 2 data		...	...	
	PEHG 2 data		...	...	
	PEHG 2 data		...	...	
	PEHG 2 data		1286	1285	Max size = 640 words; must match DSD definition.

50.3.3.1.3.4.3 Development Under PSE G2 Environment

The PD PTS models are placed on the workspaces in the hierarchy of module user-api.kb. This user-api.kb is a user application module and is not subject to NASA JSC configuration control. The user can rearrange, delete, add, or modify all contents in the hierarchy of this module except the CDB, which can only be relocated. Refer to SST-646, Part I, Section 6, and Part V for additional details on how to construct a PTS under the G2 environment.

User-api.kb consists of several elements:

a. User-Model

   1. PTS Base Model: Provides a set of templates for PTS resource usage.

   2. PTS Models: The recommended workspace to hold user models.

b. CDB

   1. The user must not do anything with this workspace except relocate it.

   2. The workspace and its subworkspace hold the PSE database (objects, data lists, and data arrays, etc.) The DBG program generates the PSE database from all c:\data\data*.csv files created from the c:\data\data\database.xls file.

c. User Initialization: Performs PTS unique initialization during program loading.

d. User-CDB: The recommended workspace to place user non-DSD data.

e. STA-Base Models: A simple Station Resource model skeleton that performs simple and basic Station Resource changes.

f. External Models: The recommended workspace to place user G2 FF interface procedures.

50.3.3.1.3.4.4 Development Under PSE FF Environment

Refer to SST-646, Part III, for additional details on how to construct a PTS under the PSE FF environment.

a. An FF infrastructure is provided as Microsoft Visual C++ modules.

b. The FF infrastructure performs MDM, PSimNet, PEHG, and SCE data exchanges between the PSE G2 environment and the PSE FF environment.

c. PSE G2 is the master scheduler that invokes FF 10-, 5-, and 1-hertz modules according to schedule.

d. The PD includes the PTS C module as a procedure call within the FF infrastructure and compiles them as a single executable ff.exe.

e. The G2 launches ff.exe during start if the flag in c:\data\configuration\station-id.cfg is set and the file ff.exe exists in the c:\process directory.

f. PTS C modules populate the FF data buffers. The G2 master scheduler distributes external interface data to the FF inbound data buffer and collects the FF outbound data buffer and sends it to the external data bus based on attributes defined in the PSE DSD.

50.3.3.1.3.5 STFx Development/Deployment Environment

a. The detailed system configuration and setup are provided in SST-646, Part IV.

b. The PSE software provides SPTC integration capability as shown in Figures 50.1-2 and 50.3-2.

c. The configuration files in c:\data\configuration should be used to set up the PSE as a component in the SPTC environment.

d. The STFx emulates the SSTF CSIOP and IOS functions.

e. The STEP emulates the SSTF C&DH function.

f. All controlling and monitoring is done at the STFx and STEP.

50.3.3.1.3.6 Software Configuration Management Capability

50.3.3.1.3.6.1 PSE/STFx Source Code

The following source codes are under configuration control of the NASA JSC Payload Control Board (PCB). Any modification and/or change to the software require approval from the PCB. The source code includes the following:

a. All COTS vendor-supplied drivers for their PC cards:

1. Windows NT Workstation Version 4 Service Pack 4

2. SBS 1553B Library Version 5.1

3. NI-DAQ Driver Library Version 6.51

4. Adaptec ANA-6944A/TX Driver Version 3

5. Gensym G2 Version 5.3

6. Microsoft Visual C++ Version 6.0

7. McAfee Virus Scan Version 5.0

b. C:\gensym\g2\kbs\pse.kb

c. Executables:

1. C:\process\1553b.exe

2. C:\process\pehg.exe

3. C:\process\psiv.exe

4. C:\process\psim_stf.exe

5. C:\process\psim_pse.exe

6. C:\process\sce.exe

d. C source and header files:

1. C:\Dev\Studio\MyProjects\src*.*

2. C:\Dev\Studio\MyProjects\ff_src*.*

e. Database templates:

1. C:\data*.*

50.3.3.1.3.6.2 Payload Training Simulator

Figure 50.3-9 shows the interface boundary between the NASA-controlled PSE and the PD-controlled PTS software.

NASA controls the pse.kb G2 Knowledge Base and the set of executables and C codes for the PSE G2 Gateway processes. Those processes include 1553B, PEHG, Psim_stfx, Psim_pse, psiv, and sce. These G2 modules, C executables, and sources are under NASA configuration control. Changes or modifications to configuration-controlled items require approval from the NASA JSC Payload Control Board.

The PD controls the user-api.kb G2 Knowledge Base and the complete c:\data directory, including the PSE Data Symbol Dictionary and executable/source codes for G2 FF if they are modified. In addition, there may be other PD executables and source codes unique to PTS applications.

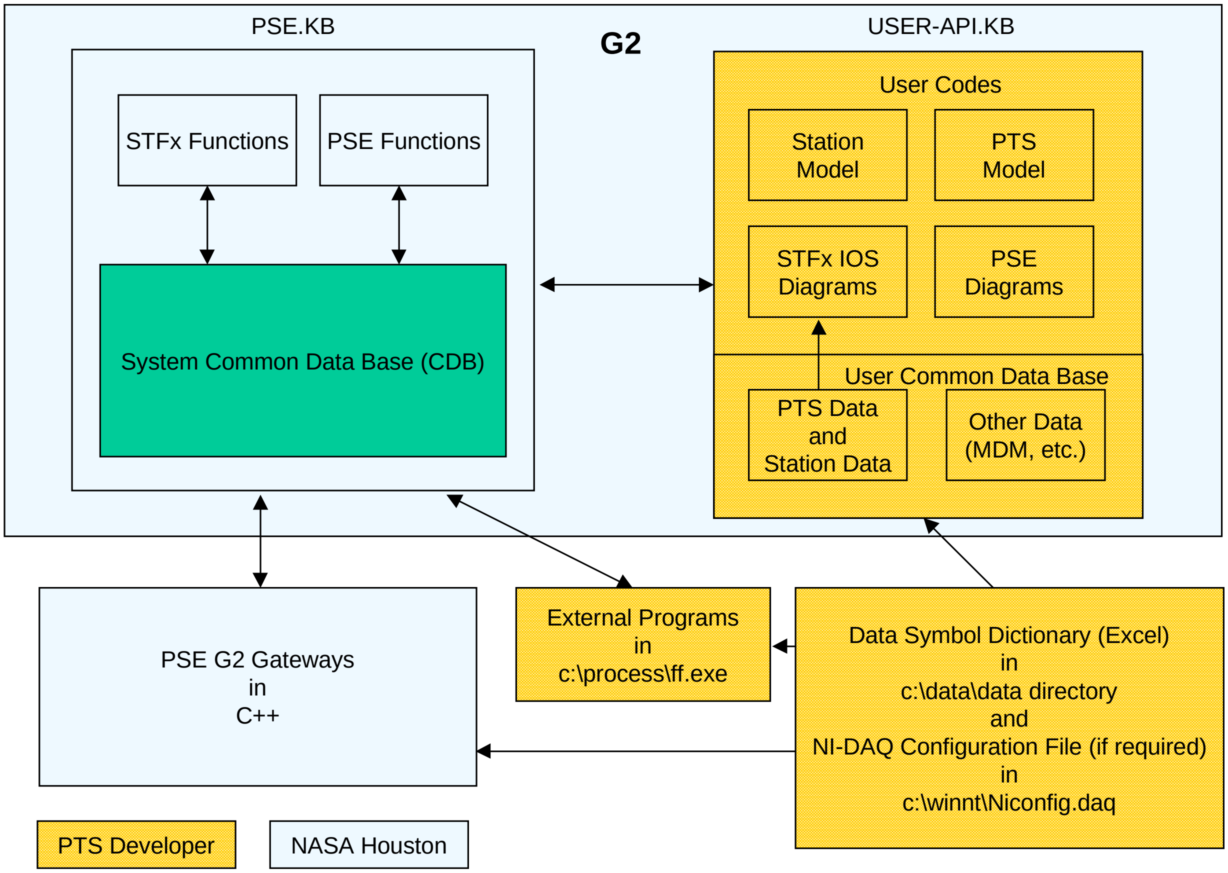

Figure 50.3-9 NASA-Controlled and PD-Controlled Software

When a PTS is delivered to JSC, the PTS will be integrated in the SPTC environment before it is configured for integration with the SSTF. The module c:\gensym\g2\kbs\user-api.kb and the files in c:\data directory, c:\process\ff.exe, and other PD-designated files will be copied to the NASA STFx computer as shown in Figure 50.3-10. The STFx PTS load therefore consists of the configuration-controlled software and PD software. This STFx PTS load is saved in separate STFx directories for archive and retrieval. Refer to SST-646, Part IV, for details.

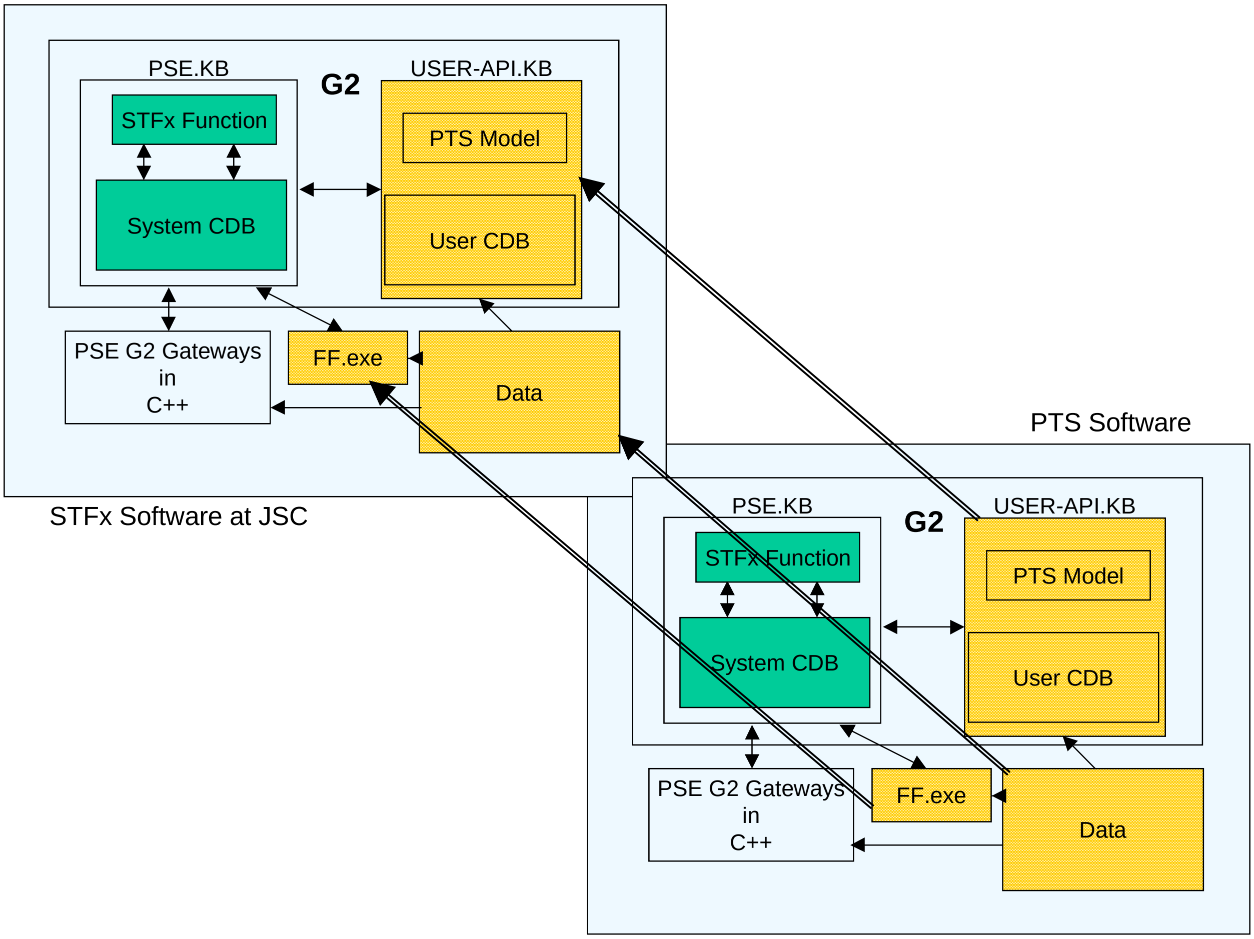

Figure 50.3-10 NASA PTS Load Configuration Control

50.3.3.2 Electromagnetic Radiation

The PSE computer, SCE, and their peripherals are COTS hardware. As standard commercial equipment, they are compliant with Federal Communication Commission (FCC) Rules and Regulations, Part 15: Radio Frequency Devices, Subpart B: Unintentional Radiators, Class A.

50.3.3.3 Identification and Marking

PSE equipment is marked for information and identification in accordance with MIL-STD-130, Identification Marking of U.S. Military Property.

PSE wire bundles are functionally identifiable at each end.

Hoist and lift points are provided and clearly labeled for PSE items requiring mechanical or power lift for movement.

50.3.3.4 Workmanship

The PSE computer, SCE, and their peripherals are COTS hardware. They are inspected and accepted according to standard industrial practices.

50.3.3.5 Interchangeability

The PSE computer, SCE, and their peripherals are COTS hardware. All parts that have the same part number are functionally and dimensionally interchangeable.

50.3.3.6 Safety

The PSE computer, SCE, and their peripherals are COTS hardware.

Their safety specification complies with applicable industry safety standards.

Caution and warning notices are prominently displayed on PSE equipment where the risk of injury to operating or maintenance personnel exists.

As far as can be ascertained, PSE equipment does not pose any threat of contamination of habitable areas.

50.3.3.7 Human Performance/Human Engineering

The PSE computer, SCE, and their peripherals are COTS hardware.

The PSE meets the intent of the human engineering principles and criteria provided in SSP-30540, Human Computer Interface Guide, and MIL-STD-1472, Human Engineering Design Criteria for Military Systems, Equipment, and Facilities.

The PSE equipment capable of generating temperatures greater than 113° F (45° C) or less than 32° F (0° C) is shielded, insulated, isolated, and/or oriented away from personnel and is labeled to warn operators of the danger.

All PSE equipment controls are labeled.

50.3.3.7.1 Accessibility

Accesses and covers are void of sharp corners and are equipped with grasping areas.

Sliding, rotating, or hinged units are free to open or rotate their full distance and remain in the open position without being supported by hand.

Any access door, lid, or cover behind which a potentially hazardous condition may exist is labeled with an appropriate warning.

50.3.3.8 System Security

50.3.3.8.1 Access Protection

The PSE/STFx complies with all security procedures and requirements specified in Appendix I, Section 10.6. All PSE/STFx units are delivered with the McAfee VirusScan program installed for virus protection. Windows NT provides system logon security. However, when the PSE is mounted inside the PTS rack, the monitor, keyboard, and mouse are not available. In this case, the PSE password is bypassed to allow the computer to power on without the need of entering a password. The password bypass procedure is described in SST-646, Part I, Section 5.1.2.

50.3.3.8.2 Reasonably Safe Software

The software is tested and determined to be reasonably safe (free of malicious design/code) for use in its intended environment.

50.3.3.9 Standards of Manufacture

The PSE computer, SCE, and their peripherals are COTS hardware. No specific standards are referenced excepted those observed, followed, and noted by the COTS vendor in the manufacturer's design document.

50.3.4 Documentation

PSE documentation includes all COTS vendor-supplied documents to maintain, operate, and repair PSE equipment.

PSE software documents are stored in the c:\data\help directory. The documents include this Product Specification and SST-646, which is provided in the following five separate documents:

a. Part I is the main user's guide that describes in detail the design and development of the PSE and STFx system. It provides descriptions of the operational and developmental environments as well as the PSE, STFx, and SPTC test procedures.

b. Part II addresses the software design and development environment of the PSE and STFx system Gateway processes. The Gateway process is the driver and communication program that manages the networking activities for the PSE and STFx.

c. Part III addresses the attachment of an external program to PSE software. The external program may be written in C, C++, or Fortran.

d. Part IV provides a description of the SPTC system configuration and the STFx operational procedure. It is intended to assist the SPTC operator in operating and maintaining the SPTC system.

e. Part V provides a procedure for building a Payload Simulator model under the PSE platform. It is organized as a roadmap for a developer to build a Payload Simulator model from the beginning using the PSE platform.

A Version document is included that provides a detailed list of all modifications, additions, and deletions since the initial release in May 1998, and a Device Upgrade Guide provides sketches, descriptions, and instructions on how the vendor device drivers are upgraded.

50.3.5 Qualification Inspection

There are six major test elements for the verification and validation of the PSE/STFx hardware and software:

a. PSimNet Interface Test

b. 1553B Interface Test

c. PEHG/Laptop Capability Test

d. SCE Interface Test

e. SPTC Integration Test

f. SSTF Interface Test

Because the test elements have a significant number of common steps, they have been addressed by one SPTC Integration Test Procedure. The test procedure consists of a set of test steps and is organized in such a way that the procedure not only serves as the acceptance test procedure but also as a step-by-step user's guide. The detailed steps of the test procedures are given in SST-646, Part 1, Section 8, SPTC Integration Test Procedure. The following sections describe the test elements and provide an outline of the test procedure.

50.3.5.1 Test Elements

For each test element, the test is described and its objectives are given. The test procedure steps in SST 646, Part 1, Section 8, that are applicable to the test element are listed for reference.

50.3.5.1.1 PSimNet Interface Test

The test steps in Table 50.3-34 verify the PSE PSimNet interfaces in either the two-station or Combined-station configurations. The objective of this test is to ensure the successful integration of the PSE into the SPTC configuration and ultimately with the CSIOP at the SSTF.

Table 50.3-34 PSimNet Interface Test

Step	Activity
1.000	Pre-Startup (Setups for STFx, PSE, or Combined)
2.000	Startup (STFx, PSE, or Combined)
3.000	Connection Initialization (from STFx to PSE)
4.000	Mode Control (STFx issues mode control message to PSE)
4.100	Simulation Initialization
4.200	Datastore
4.300	Run
4.400	Freeze
4.500	Record Safestore Point
4.600	Return to Safestore Point
4.700	Hold
4.800	Terminate
5.000	Data View and IO View (Utilities)
6.000	Station and Payload Periodic Data Transfer
7.000	Malfunction Control
8.000	Poke
9.000	Miscellaneous PSimNet Commands
9.100	Ping
9.200	Error Acknowledge
10.000	Logs
12.000	Payload Common Database (Utilities)
13.000	Model Development (Environment)
14.000	STFx Script (Generation and Execution)
20.000	GPM Demonstration

50.3.5.1.2 1553B Interface Test

The test steps in Table 50.3-35 verify the PSE 1553B interfaces in either the two-station or Combined-station configuration. The STFx station or the STFx function in a Combined PSE/STFx station is used to control the test process. The objective of the test is to ensure the successful integration of the PSE under the SPTC configuration and ultimately with C&DH at the SSTF.

Table 50.3-35 1553B Interface Test

Step	Activity
1.000	Pre-Startup Setups (for STFx, PSE, Combined, and STEP)

2.000	Startup (STFx, PSE, Combined, and STEP)
3.000	Connection Initialization (from the STFx to the PSE and the PSE to the STEP)
15.000	1553B Interfaces
15.100	1553B Broadcast Time
15.200	1553B Broadcast Ancillary Data
15.300	1553B Unique Ancillary Data
15.400	Commands
15.500	Service Requests
15.600	1553B Health and Status Data
15.700	1553B Low-Rate Telemetry Data
15.800	1553B File Transfer (Outbound)
15.900	1553B File Transfer (Inbound)
20.000	GPM Demonstration
20.100	GPM Example 1
20.200	GPM Example 2
20.300	GPM Example 3
20.400	GPM Example 4
20.500	GPM Example 5 Manual Mode
20.600	GPM Example 5 Script Mode

50.3.5.1.3 PEHG Capability Test

The test steps in Table 50.3-36 verify the PSE PEHG/laptop interfaces in either the two-station or Combined PSE/STFx configuration. Since there is no PEHG/laptop data protocol defined, this test only demonstrates the capability provided by the PSE to receive messages from the laptop or establish payload-to-payload communication between integrated PTSs. Tests include the demonstration of the PSE to switch between server and client mode programmatically or manually and to pass an integer data array between the partner stations.

Table 50.3-36 PEHG Capability Test

Step	Activity
1.000	Pre-Startup (Setups for STFx, PSE, Combined, and STEP)
2.000	Startup (STFx, PSE, Combined, and STEP)
3.000	Connection Initialization (from the STFx to the PSE, and from the PSE to the STEP)

50.3.5.1.4 SCE Interface Test

The test steps in Table 50.3-37 verify the PSE I/O interfaces in either the two-station or Combined PSE/STFx configurations. The STFx station or the STFx function in the Combined PSE/STFx is used to control the test process. The objective of the test is to ensure the successful integration of the PSE with SCE and a demonstration I/O panel.

Table 50.3-37 SCE Interface Test

Step	Activity
1.000	Pre-Startup (Setups for STFx, PSE, Combined, and SCE)
2.000	Startup (STFx, PSE, Combined, and SCE)
3.000	Connection Initialization (from the STFx to the PSE and the SCE)
17.000	SCE Interfaces
17.100	Normal I/O Transfer
17.200	Panel Switch Verification
20.000	Generic Payload Models (output I/O data changes from the PSE to the SCE; input I/O data changes from the SCE to the PSE)

50.3.5.1.5 SPTC Integration Test

This test verifies that the SPTC meets the integrated SPTC requirement. The verification process combines the integrated PSimNet, 1553B, SCE interface tests, and an additional test for the STFx and STEP interface. The objective is to demonstrate the standalone training capability and to ensure the successful integration of the PSE/SCE with the SSTF.

The test can be performed in either the two-station or Combined PSE/STFx configuration. An Ethernet wire connecting the STFx with the STEP internal Ethernet port is required for the test.

50.3.5.1.6 SSTF Interface Test

After passing the SPTC Integration Test, the PSE and SCE are ready for the SSTF Interface Test.

There is no test procedure for the SSTF Interface Test. In this test, the PSE is a passive device with GPM running. All actions are initiated from the CSIOP. The PSE/SCE responds to CSIOP and C&DH commands and messages.

Standard CSIOP IOS procedures should be used to verify the performance and completeness of the PSE design.

50.3.5.2 Test Procedure Outline

The SPTC Integration Test Procedure is organized in such a way that the procedure not only serves as the acceptance test procedure but also as a step-by-step user's guide. The test procedure is provided in SST-646, Part I, Section 8.

The test procedure is written in tabulated format with six columns:

a. Column 1 identifies the test step.

b. Column 2 indicates at which station (STFx, PSE, or Combined PSE/STFx) this action or observation should be performed.

c. Column 3 describes the test action.

d. Column 4 states the expected results from the action.

e. Column 5 is a comment field used to provide additional information on the step.

f. Column 6 is a check field that is used during the acceptance test.

Viewed from the screen using Microsoft Excel, the entries marked in black are for PSimNet-related interfaces, the entries marked in red are for STEP-related interfaces, and the entries marked in blue are for SCE-related IO interfaces.

The outline of the test procedure is shown in Table 50.3-38.

Table 50.3-38 SPTC Integration Test

Step	Activity
1.000	Pre-Startup (Setups for STFx, PSE, Combined, STEP, and/or SCE)
2.000	Startup (STFx, PSE, Combined, STEP and/or SCE)
3.000	Connection Initialization
4.000	Mode Control (STFx issues mode control message to PSE, STEP via PSIV, and indirectly from PSE to SCE.)
4.100	Simulation Initialization (PSE, STEP, SCE)
4.200	Datastore (PSE)

Step	Activity
4.300	Run (PSE, STEP)
4.400	Freeze (PSE, STEP)
4.500	Record Safestore Point (PSE)
4.600	Return to Safestore Point (PSE, SCE)
4.700	Hold (PSE, STEP)
4.800	Terminate (PSE, STEP, SCE)
5.000	Data View and IO View (Utilities)
6.000	PSimNet Periodic Data (Transfer)
6.100	Station Data (STFx to PSE)
6.200	PTS Data (PSE to STFx)
7.000	Malfunction Control
8.000	Poke
9.000	Miscellaneous PSimNet Commands
9.100	Ping
9.200	Error Acknowledge
10.000	Logs
11.000	Error Handling
12.000	Payload Common Data Base (Utilities)
13.000	Model Development
14.000	STFx Script (Generation and Execution)
14.100	PSE Verification Script
14.200	Condition Check Script Example
15.000	1553B Interfaces
15.100	1553B Broadcast Time
15.200	1553B Broadcast Ancillary Data
15.300	1553B Unique Ancillary Data
15.400	Commands
15.500	Service Requests
15.600	1553B Health and Status Data
15.700	1553B Low-Rate Telemetry Data
15.800	1553B File Transfer (Outbound)
15.900	1553B File Transfer (Inbound)
16.000	PEHG Capability Test
17.000	SCE Interfaces

Step	Activity
17.100	Normal I/O Transfer
17.200	Panel Switch Verification
18.000	PSIV Interfaces
18.100	Connection
18.200	Run/Freeze
18.300	UA/BA Data Transfer
18.400	Timeliner Command Control
19.000	1553B Error Handling
20.000	GPM Demonstration
20.100	GPM Example 1
20.200	GPM Example 2
20.300	GPM Example 3
20.400	GPM Example 4
20.500	GPM Example 5 Manual Mode
20.600	GPM Example 5 Script Mode

From one step to the next, the second column should be used as a guide to the initiation and observation station. If you have a Combined PSE/STFx, look for the entry for the Combined station. Most of the entries are very similar between the two-station and the Combined PSE/STFx, but some are not.

Steps 1 through 14 are written in detailed step-by-step instructions, such as click button x, etc. Steps 15 through 20, on the other hand, are written in more generic form, such as perform initialization, etc.

50.4 QUALITY ASSURANCE PROVISIONS

50.4.1 General

Verification of the PSE is performed as specified in the following sections and in accordance with Section 3.5.

50.4.1.1 Responsibility for Inspection

The Raytheon Program Office and Quality Assurance staff, witnessed by NASA JSC representatives, are responsible for conducting the periodic and/or revision qualification.

50.4.1.2 Special Tests and Examinations

The PSE software has been verified and accepted according to the provisions in Section 3.5 of this document. The step-by-step test procedure is provided in SST-646, Part I, Section 8. This procedure will be used as the periodic and/or revision verification procedure.

50.4.2 Quality Conformance Inspections

Table 50.4-1 provides a requirement traceability and verification matrix that identifies PSE requirements and one or more test procedure steps that verify each requirement.

Table 50.4-1 Requirements Traceability/Verification Matrix

Paragraph Number	Paragraph Title	Test Procedure Steps
50.3	PSE/STFx Description	
50.3.1	PSE/STFx Definition	
50.3.1.1	PSE/STFx System Overview	
50.3.1.2	Interface Definition	
50.3.1.2.1	1553B Interfaces	15
50.3.1.2.2	PSimNet Interfaces	3, 4, 6, 7, 8, 9
50.3.1.2.3	PEHG Interfaces	16
50.3.1.2.4	SCE Interfaces	17
50.3.1.2.5	PSIV Interfaces	18
50.3.1.3	Major Component List	
50.3.2	Characteristics	
50.3.2.1	Performance	
50.3.2.2	Physical Characteristics	
50.3.2.3	Reliability	

Paragraph Number	Paragraph Title	Test Procedure Steps
50.3.2.4	Maintainability	
50.3.2.5	Environmental Conditions	
50.3.2.6	Transportability	
50.3.3	Design and Construction	
50.3.3.1	Materials, Processes, and Parts	
50.3.3.1.1	COTS Hardware	SST-646, Part IV
50.3.3.1.2	COTS Software	SST-646, Part IV
50.3.3.1.3	PSE/STFx Software	SST-646, Parts I – V
50.3.3.1.3.1	PSE/STFx Component Design	SST-646, Parts I – V
50.3.3.1.3.1.1	PSE/STFx Executive Software	1 - 20
50.3.3.1.3.1.2	Database Management	12
50.3.3.1.3.1.3	1553B Interfaces	15
50.3.3.1.3.1.4	PEHG Interfaces	16
50.3.3.1.3.1.5	PSimNet Interfaces	3, 4, 6, 7, 8, 9
50.3.3.1.3.1.6	SCE Interfaces	17
50.3.3.1.3.1.7	PSIV Interfaces	18
50.3.3.1.3.1.7.1	PSIV Protocol	SST-646, Part II
50.3.3.1.3.1.7.2	PSIV-STFx Communication	SST-646, Part II
50.3.3.1.3.1.7.3	Interface Commands	SST-646, Part II
50.3.3.1.3.1.8	STFx Script	14
50.3.3.1.3.1.9	Timeline Control Command	
50.3.3.1.3.2	Graphical User Interfaces (GUI)	1 - 19
50.3.3.1.3.2.1	Top Menu Bar Selections	1 - 19
50.3.3.1.3.2.2	Bottom Menu Bar Displays/Selections	1 - 19
50.3.3.1.3.3	PTS Deployment Environment	13
50.3.3.1.3.3.1	SPTC Integration Capability	20
50.3.3.1.3.3.2	SSTF Integration Capability	*
50.3.3.1.3.4	PTS Model Development Environment	13
50.3.3.1.3.4.1	Interface Data Definition Baseline	SST-646, Parts I – V
50.3.3.1.3.4.2	Interface Data Definition	SST-646, Parts I – V
50.3.3.1.3.4.3	Development Under PSE G2 Environment	SST-646, Part V
50.3.3.1.3.4.4	Development Under PSE FF Environment	SST-646, Part III

Paragraph Number	Paragraph Title	Test Procedure Steps
50.3.3.1.3.5	Software Configuration Management Capability	SST-646, Part IV
50.3.3.1.3.5.1	PSE/STFx Source Code	SST-646, Part IV
50.3.3.1.3.5.2	Payload Training Simulator	SST-646, Part IV
50.3.3.2	Electromagnetic Radiation	
50.3.3.3	Identification and Marking	
50.3.3.4	Workmanship	
50.3.3.5	Interchangeability	
50.3.3.6	Safety	
50.3.3.7	Human Performance/Human Engineering	
50.3.3.7.1	Accessibility	
50.3.3.8	System Security	
50.3.3.8.1	Access Protection	SST-646, Part I
50.3.3.8.2	Reasonably Safe Software	
50.3.3.9	Standards of Manufacture	
50.3.4	Documentation	
50.3.5	Qualification Inspection	

* Performed using the SSTF Integration Test Procedure.

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50.5 NOTES

50.5.1 Acronyms and Abbreviations

ABI/ASF	Advanced Bus Interface/Advanced Single Function
AI	Analog Input
AO	Analog Output
API	Application Program Interface
APID	Application Program Interface Definition
BA	Broadcast Ancillary
BADATA	Broadcast Ancillary Data
BCD	Binary-Coded Decimal
C&DH	Command and Data Handling
CCSDS	Consultative Committee for Space Data System
CDB	Common Database
CD-ROM	Compact Disk Read-Only Memory
CMD	Command
COTS	Commercial Off-the-Shelf
CPU	Central Processing Unit
CSIOP	Crew Station Input/Output Processor
CSMA/CD	Carrier Sense Multiple Access with Collision Detection
DAQ	Data Acquisition
DB	Database
DBG	Database Generation
DI	Digital Input
DO	Digital Output
DSD	Data Symbol Dictionary
ENet	Ethernet
EEE	Electrical, Electronic, and Electromechanical
F	Fahrenheit
FCC	Federal Communication Commission
FDDI	Fiber-Distributed Data Interface
FF	Foreign Function
FTT	Full-Task Trainer
GB	Gigabyte
GMT	Greenwich Mean Time
GPM	Generic Payload Model
GSI	Gateway Standard Interface
GUI	Graphical User Interface

H&S, HAS	Health and Status
Hz	Hertz
I/O	Input/Output
IC	Initial Condition
ID	Identification
IEEE	Institute of Electrical and Electronic Engineers
IIP	ISPR-Mounted Interface Panel
IOS	Instructor/Operator Station
IP	Internet Protocol
ISA	Industry Standard Architecture
ISPR	International Standard Payload Rack
JSC	Johnson Space Center
LAN	Local Area Network
LDP	Logical Data Path
LRT	Low-Rate Telemetry
LSB	Least Significant Bit
LSW	Least Significant Word
m	meter
MB	Megabyte
MC	Mode Code
MDM	Multiplexer/Demultiplexer
MHz	Megahertz
MIL-STD	Military Standard
MMI	Man-Machine Interface
MSB	Most Significant Bit
MSW	Most Significant Word
MTBF	Mean Time Between Failures
NASA	National Aeronautics and Space Administration
NI	National Instruments
NT	Microsoft Windows NT Operating System
OBCS	Onboard Computer System
PC	Personal Computer
PCB	Payload Control Board
PCI	Peripheral Component Interconnect
PD	Payload Developer
PDC	Payload Development Center
PED	Payload Element Developer

PEHG	Payload Ethernet Hub Gateway
PL	Payload
PSE	Payload Simulator Environment
PSimNet	Payload Simulator Network
PSIV	Payload Software Integration and Verification
PSV	Panel Switch Verification
PTC	Payload Training Capability
PTS	Payload Training Simulator
PUDG	Payload User Development Guide
R/T LAN	Real-Time Local Area Network
RAM	Random Access Memory
RISC	Reduced Instruction Set Computer
RPC	Remote Procedure Call
SBS	SBS Technologies, Inc.
SCE	Signal Conversion Equipment
SCSI	Small Computer System Interface
SGMT	Simulated Greenwich Mean Time
SIP	Standoff-Mounted Interface Panel
SPTC	Standalone Payload Training Capability
SR	Service Request
SSP	Space Station Program
SSTF	Space Station Training Facility
STA	Station
STEP	Suitcase Test Environment for Payloads
STFx	Simulator Text Fixture
TCP	Transmission Control Protocol
TLM	Telemetry
UA	Unique Ancillary
UADATA	Unique Ancillary Data
UDP	User Datagram Protocol
USOS	U.S. Onorbit Segment
VAC	Volts Alternating Current
ZOE	Zone of Exclusion

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